



**Program for Reduction of Emissions from Deforestation and Forest Degradation in Central America and the Dominican Republic
(REDD – CCAD – GIZ)**

User's Manual for the +BOSQUE Land Analysis System for Forest Resources

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1. INTRODUCTION

Within the context of the international discussion on Reduction of Emissions caused by Deforestation and Forest Degradation (known as REDD), the countries of Central America have proven to be willing to prepare on a structural level for an international REDD system through several regional strategies. The topic of REDD requires close collaboration between the countries of the region, both for the economies of scale that such collaboration could generate, as well as for the possibility of exchanging positive experiences and reducing the risk of displacement of deforestation from one country to another (leakage). This has led the REDD-CCAD-GIZ Program to support Central American countries through a regional approach centered around improving framework conditions and building capacity of key REDD actors.

The program works across three components:

- 1) Inter-sector dialogue
- 2) Sustainable implementation instruments
- 3) Monitoring and reporting

The purpose of the project is to lay the groundwork for the CCAD member countries to implement sustainable compensation mechanisms for the reduction of CO₂ gas emissions from deforestation and forest degradation. The duration of the project is six years (October, 2009 until September, 2015). The current phase lasts three years and six months (from October, 2009 to March, 2013).

This work system fits within the objectives of Component 3 of the REDD program: *“Decision makers and institutions required to report to UNFCCC have the necessary materials and data regarding supervision of CO₂ emissions from deforestation and forest degradation.”*

In the year 1998, the CONAF-GTZ project in Chile developed and implemented – with technical support from the IT company SINTEC Ltd. – a software program designed to process and analyze information from forest inventories. Although this system had highly technical processing standards, after 12 years it began to present obvious technical obsolescence, as is to be expected given the progress and changes in information technology over this period.

During the first months of the year 2011, a series of technical improvements were made to the land analysis system for forest resources in order to generate reports related to REDD mechanisms and facilitate compliance with current forecast requirements.

The efforts to build capacity in information technology for efficient processing of forest resource inventory data respond to the requirements to include biomass and carbon existence estimates in inventory products so that these inventories may eventually be incorporated into REDD mechanisms. This implies progress toward producing estimates with limited sampling errors, along with continuous monitoring to assess effective compliance with the requirements for eventual REDD payments.

In general, National Inventories have not placed great emphasis on dasometric values in forests, instead focusing on identification of vegetation resources in order to define medium and long-term policies.

The REDD mechanism, however, requires absolute clarity in terms of quantification – with a known and limited margin of error – of dasometric variables to estimate existence of and changes in carbon content, the underlying logic for the creation of REDD.

Alongside this requirement, forest planning activities and the sustainable management of natural forests requires clear information with respect to the forest as well as the environment in which it is developing. Forest resource inventories become the basic tools to cover this need, providing duly processed research and information to facilitate decision-making in forestry policy and management.

In this context, the **Program for Reduction of Emissions from Deforestation and Forest Degradation in Central America and the Dominican Republic (REDD-CCAD-GIZ)** has been working to develop and refine the Land Analysis System for Forest Resources, whose core objective is to facilitate processing and transfer of information emerging from forest inventories, incorporating the most important variables associated to forest resources and their surrounding environment. This work seeks to catalyze and inform the decision-making process for silviculture planning, prescription, and management, and even to speed in building the technical quality standards for the REDD mechanisms.

This document summarizes the main components and characteristics of the +BOSQUE system and explores the potential applications of the program. The document also provides basic context and considerations for the design and development of the program; these considerations were key factors in the system's structure.

This manual seeks to provide necessary instructions for users to obtain the maximum benefit from program functions.

+BOSQUE is oriented toward all users who have a direct link to forest inventory administration; in this system these users will be responsible for the correct management of system information.

Each concept is discussed in depth so that the user may clearly understand the way in which the Land Analysis System for Forest Resources may simplify their work.

Given these goals, each one of the chapters of this manual provides basic specifications for user interaction with the system.

2. SYSTEM CHARACTERISTICS

The +BOSQUE Land Analysis System for Forest Resources is a computer platform designed to facilitate processing and presentation of forest inventory information, covering the most important variables associated to forest resources and their environment, and catalyzing the process of analysis of quantitative data generated from forest inventories.

The system also allows for individual analysis of each one of the variables associated to the information collected, linking these data streams and providing a solid framework to generate processed data, make proposals for management, or produce specific reports on variables of interest.

Startup screen for the +BOSQUE Land Analysis System for Forest Resources



The system was modeled around the specific requirements of the direct users of the program. Detailed technical specifications were built around these requirements for optimal functioning.

Another central characteristic of the software is that it offers users the opportunity to work in an agile and user-friendly environment; the platform is 100% compatible with Windows. This is an advantage for forest professionals who are not comfortable working in other operating systems.

Technical Characteristics

- The system execution platform runs under 32 bit Windows, and was developed in Delphi 5.0.

- FireBird 2.1 database engine

Minimum Requirements

- Minimum of 1 GB RAM
- Minimum of 50 MB free disk space for the system
- Minimum of 500 MB free disk space for data storage (depending on the user)
- Windows XP or higher, 32 or 64 bits
- Screen with 1024x768 pixel resolution

Database Engine

Firebird takes its source code from Borland's Interbase 6.0. It is open source software and there are no dual licenses. It is open source for applications and commercial use, that is, totally free. FireBird technology has been functioning for 20 years, making this a very mature and stable product.

As FireBird has developed, new versions have emerged with new characteristics and opportunities. Version 1.0 simply presented the Interbase 6.0 code in C, Version 1.5 converted FireBird to C++, Version 2.0 added new characteristics such as divided tables, etc., and Version 2.1 added session management capabilities.

FireBird has all of the power of a RDBMS. Databases anywhere from a few kb to several gigabytes can be powered with good performance and very little maintenance.

General characteristics of FireBird:

- Complete support for stored procedures and triggers
- Multi-referenced integrity
- Multi-generational architecture
- Low consumption of resources
- Full language for stored procedures and triggers (PSQL)
- Support for external functions
- Little or no need for specialized DBAs
- Practically no configuration required
- Large community and many pages for free help and support
- Option to use the embedded version – single file – ideal for creating CD-ROMs with catalogues, test versions, or single-user applications
- Dozens of third-party tools, including visual tools for administration and replication, etc.
- Safe writing – recovery with no need for transaction logs
- Many forms of accessing databases: Native/API, dbExpress Driver, ODBC, OLEDB, .Net provider, Native JDBC type 4 driver, Python module, PHP, Perl, etc.
- Native support for main operating systems, including Windows, Linux, Solaris, and MacOS
- Incremental back-ups
- Available for 64 bit architecture
- Complete implementation for cursors in PSQL.

System Characteristics

- Programming language: Pascal Object (Delphi)

- Execution Platform: Windows 98, XP, Vista, and 7
- Languages: Currently supports English and Spanish

Data Loading

- Internal: The system has a series of formats for input of general information as well as administrative, transaction, and biometric data.
- External: There is a system of Excel worksheets which may be fed into the system with transaction data (inventories, plots, trees, regeneration, etc.)

Inventory Storage Web for Information Sharing

The system has been developed for a web environment, with centralized data storage (FireBird database) and an applications server (OC4J) to maintain controlled access.

The JDeveloper tool, a development tool provided by Oracle, was used to incorporate the necessary technology for system development. J2EE, ADF, JSF, AJAX Framework, and CSS tools were used too.

Java (J2EE) programming language was used to facilitate object management, use of inheritance and polymorphisms, and search functions with complex and specific representations.

The system may function as a Local (Stand-alone) application or work with a centralized base of general tables (Server).

+BOSQUE may work independently (stand-alone) or connected to a central database repository (server).

When access is gained locally, entry is allowed for all system options with no need for a password, with administrator privileges.

When working in Server mode it is necessary to specify the user, password, and server location. With these parameters a connection may be established with the server, and data may be shared with other users on the same server.

When connected to the system in Server mode, the user will only have access to those options available to his or her profile.





3. SYSTEM OPERATIONS

3.1. Standard Functions

Certain defined function buttons have been provided to facilitate system use. These buttons serve the same functions and are located in the same part of the screen throughout the system. Functions and use of these buttons are described below:

Navigation Bars

Graphic device to move vertically or horizontally through a file with the mouse. Navigation bars are located on the bottom left side of the window.

Para	Haga esto
Desplazarse un registro hacia atrás	Haga clic en 
Desplazarse un registro hacia adelante	Haga clic en 
Desplazarse al primer registro	Haga clic en 
Desplazarse al último registro	Haga clic en 

The system also has a vertical navigation bar that can be used to move the screen vertically with the mouse. This navigation bar is found on the right side of the system window, and only works when there is more than one page of entries.


Add, Modify, or Eliminate an Entry

Information may be added to entries in the data source, and existing entries may be modified or eliminated.

To add, modify, or eliminate entries in a data source:

- Show data entries by clicking on the add, modify, or eliminate buttons
- Follow the steps shown in the table below
- Choose the “Accept” or “Cancel” buttons

ACTION	PROCEDURE
Show a blank file to add a new entry	 Click on the “Add” button
Modify an existing entry	 Select the entry you wish to modify and

	edit the attributes by clicking on the "Modify" button.
Eliminate the entry on the screen	 Select the entry you wish to eliminate and click the "Eliminate" button. The system will request confirmation, asking you to accept or cancel elimination.

Exit



Exits a window that is open.

Data List



Displays a list of values in an associated table, select the desired value by double-clicking on the icon or value.

Help



Help has been designed for each of the system windows. In any window the user can click the help button and display a window with related information.

Print



Generates a printed report.

Accept



This icon instructs the system to record the information that the user has entered or modified.

Cancel



This icon instructs the system to cancel the selected action or entered information and exit the working window.

3.2. Using the Keyboard

Tabulation Key


This key is used to move from one field to another within the same screen.

Enter Key

Once data have been entered into the system this key is used to record the information; the Enter key is equivalent to the Accept icon.

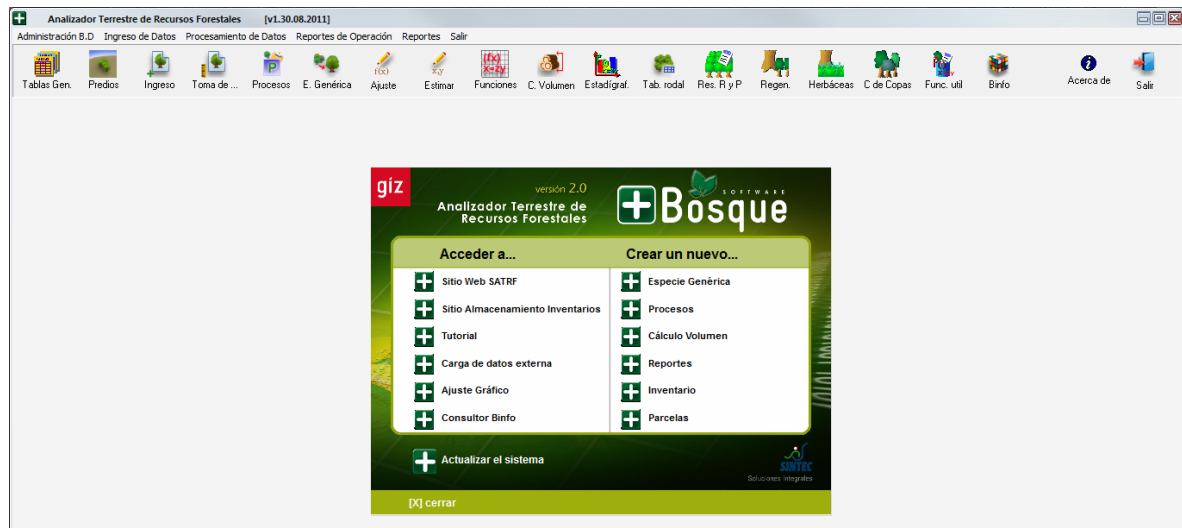
4. ENTERING THE SYSTEM FOR THE FIRST TIME

Use the following steps to enter the system for the first time:

- Turn on your machine in a Windows environment.
- Open the Land Analysis for Forest Resources Program group.
- Double-click on the  icon. The following window will appear:

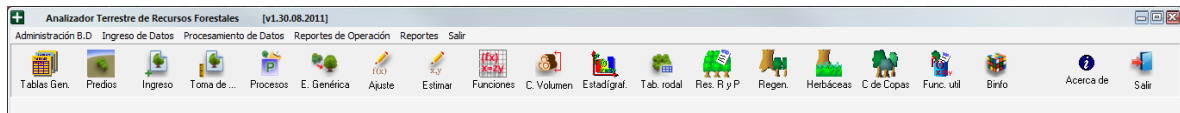


- Select the Server or Stand-alone mode in Spanish or English (under construction). Then press . The main screen of the system will appear.



- On the main screen there are three options for the work required: Menu, Icons and Launch Pad.
- On the main menu, select one of the following work options:

- Database Administration
- Data Entry
- Data Processing
- Operating Reports
- Reports
- Exit



Main menu of the Land Analysis System for Forest Resources program

Database Administration

The Database Administration module allows the user to store all pertinent information including land data, definitions prior to land data input, and codification of variables.

Data Entry

The Data Entry module allows information to be fed into the previous module with data collected from the field. This data is standardized, grouped, and appropriately stored from a technological standpoint.

Operating Reports

The Operating Reports section groups all those reports necessary for data processing, not necessarily the final results produced by the system.

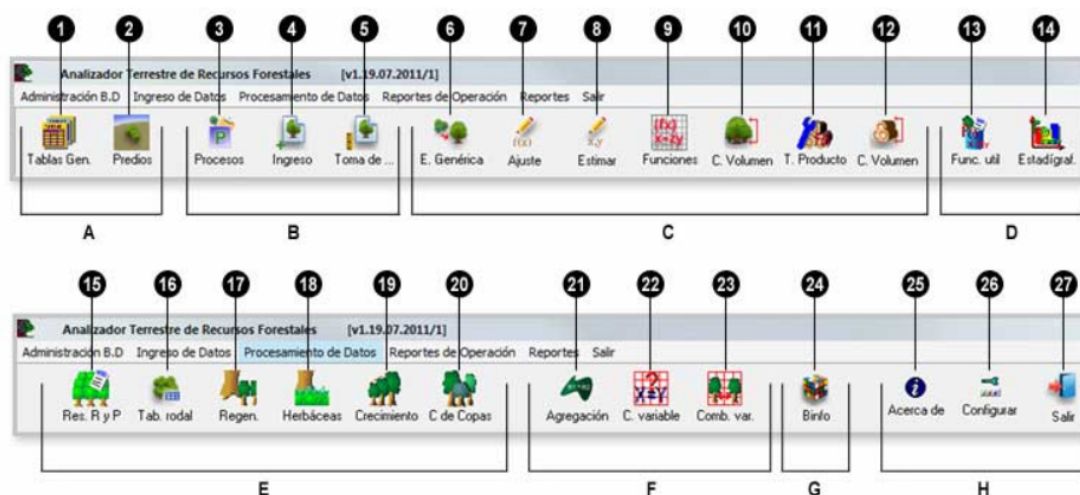
Reports

Results reports are found in the Reports section. These reports provide the finalized information after the processes performed by the system.

Exit

This option allows the user to leave the system.

- On the Icon Bar, select one of the following options:



Description of direct access icons in the Land Analysis System for Forest Resources program

A. DATABASE ADMINISTRATION:

1. General Tables: Access General Tables to configure and define codification and factors.
2. Fields: Access the Fields table to define new fields and stands.

B. DATA ENTRY:

3. Processes: Open a window to define a process /
4. Inventory entry: Open a window to define an inventory /
5. Data collection: Open formats to enter data by Sample Unit /

C. DATA PROCESSING:

6. Generic species: The user may group tree species to make adjustments in height regression analysis and other variables.
7. Adjustments: View height regression adjustments and other variables using different models. /
8. Estimate: Application of selected height functions or other variables for the trees in all process plots. /
9. Volume functions: Format to store volume functions and assign them to one or more tree species.
10. Volume calculation: Application of volume functions to the total tree sample of a process. /
11. Products table: Defines health, straightness, form restrictions, and diametric limits to differentiate products. /

12. Volume calculation: Calculates the volume of products according to the configuration defined in the Products table.

D. OPERATING REPORTS:

13. Functions used: Shows the functions of volume and adjustments used in a given process. /

14. Statigraphs: Calculates the statigraphs (sampling error and confidence intervals) for a process.

E. RESULTS REPORTS:

15. Results by stand and plot: Shows a summary of results for processing by stand, plot, and species. /

16. Stand table: Builds and presents tables of stands and stocks in accordance with defined parameters. /

17. Regeneration study: Shows information related to regeneration of the processed inventory. /

18. Herbaceous vegetation: Shows information regarding the presence and abundance of herbaceous species in the processed inventory. /

19. Growth: Shows information related to growth of the processed inventory. /

20. Canopy coverage: Shows information related to canopy coverage of the processed inventory.

F. TOOLS FOR ANALYSIS:

21. Stand aggregation: Allows the user to group or ungroup stands to reprocess information from an inventory (post-process). /

22. Variables comparison: Allows the user to compare variables between stands and plots to identify similarities and differences. /

23. Variables combination: Allows the user to view one variable in function of others in order to visualize behavioral trends.

G. SEARCH ENGINE:

24. BINFO: System search engine to access all raw and processed information.

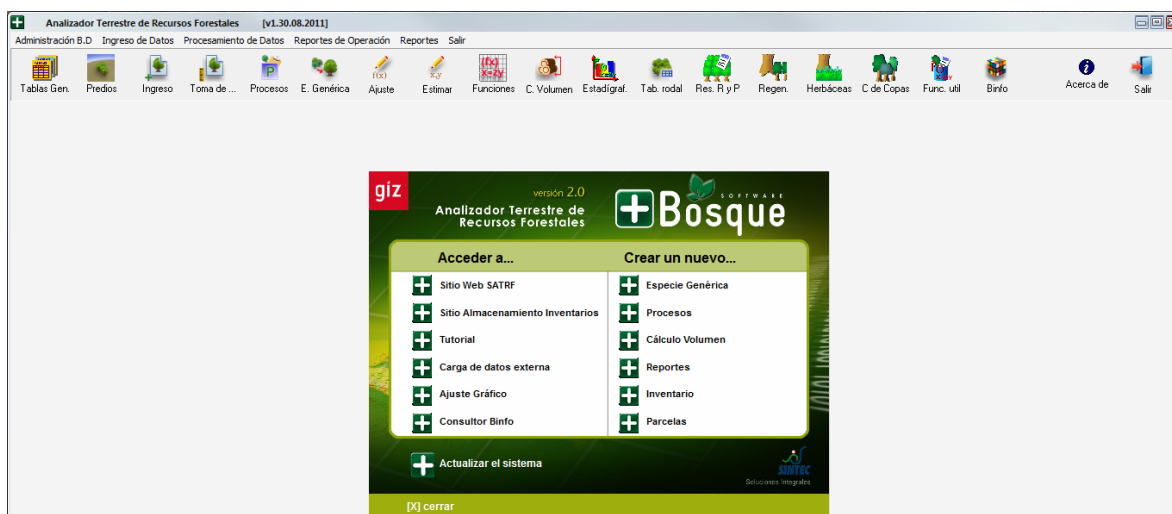
H. GENERAL INFORMATION:

25. About...: System information /

26. Configure: Allows the user to select the icons to be shown on the main screen of the system. /

27. Exit: Exit the system.

- In the Launch Pad, select one of the following options:



Direct access options available in the Land Analysis System for Forest Resources Launch Pad

Access the +BOSQUE Web Site

Opens the web site for the Land Analysis System for Forest Resources to review the system characteristics.

Access the Inventory Storage Site

Opens the web site to store results from inventories processed through +BOSQUE so that these results may be available for others to view.

Open the Tutorial

Connects to the LEARNING option of the system web site where the working procedures are explained.

Access External Data Upload

Allows the user to upload data into the system from a previously completed Excel worksheet with information from the required inventory.

Open Graphic Adjustment

Opens the option for graphic adjustment of regression analysis functions to view the adjustment procedures for different regression models and variables linked to DBH.

Access to BINFO Search

Opens the BINFO search engine that allows access to both the basic variables input into the system as well as the variables calculated by the system itself.

Create New Generic Species

Opens the window to create generic species that will be used to later make regression adjustments necessary to obtain variables linked to DBH.

Create a New Process

Opens the process window where the user can select inventories, fields, stands, and plots to be processed.

Create a New Volume Calculation

Opens the volume calculation window that allows the user to calculate volume by tree or by individual species, using defined volume functions for forest types and sub-types.

Create a New Report

Opens the parameters and request screen for the general reporting function of the system.

Create a New Inventory

Opens the inventory window that allows the user to define new inventories, fields, and stands.

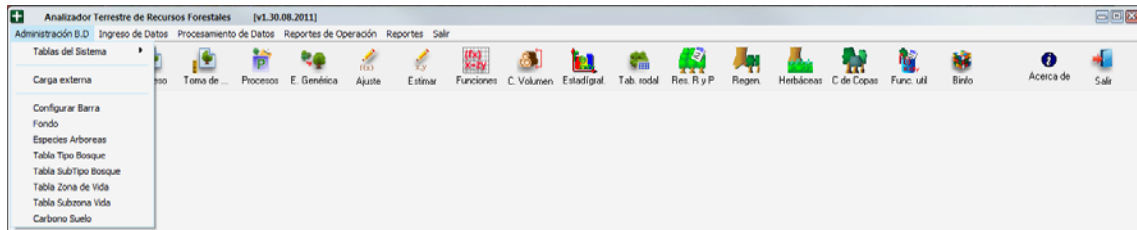
Create a New Plot

Opens the data-plot entry window that allows the user to modify plot data or enter data for new plots for inventory.

Update the System

Connects to the HELP option from the system website where the user may find information for system update procedures.

5. DATABASE ADMINISTRATION



The Database Administrator module stores all of the information gathered from the terrain, outside definitions prior to entry in the database, or codification of separate variables.

The Database Administrator may be described by the following schematics:

System Tables:

- General Tables

- Fields Tables

- Tree Species

- Forest Types

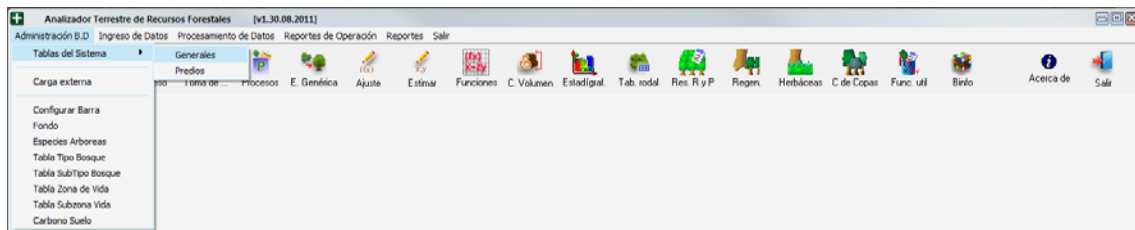
- Forest Sub-Types

- Life Zone

- Life Sub-Zone

- Soil Carbon

5.1 System Tables



Under this menu, the user can find **System Tables** to store all of the system reference information used for the subsequent options. This type of storage ensures that each time the reference information is requested it will be available for selection. “Modify”, “eliminate”, and “add new” operations may be performed within tables. These operations will be presented separately in tables built with a code that identifies each parameter and its description.

It is important to note that the definitions in these tables should be permanent, as they will be employed by all users. New concepts may be incorporated, though these concepts should be general knowledge to ensure comparability between the eventual results obtained by different users.

As noted above, “modify”, “eliminate”, and “add new” functions may be performed within these tables, for new entries with the following variables:

- Geographic variables
 - Exposure
 - Physiographic position
 - Slope
- Edaphic variables
 - Rock type
 - Soil type
 - Texture
 - Structure
 - Depth
 - Drainage
 - pH
 - Soil series
- Vegetation variables
 - State of development
 - Origen
 - Structure
 - Composition
 - Understory coverage
 - Understory type
- Other variables
 - Natural monument
 - Strategic areas (1 to 5)

- Distance to roads
 - Road type
 - Road quality
- Herbaceous species and weeds
- Quality
 - Straightness
 - Form
 - Health
- Phytosanitary status
 - Signs and symptoms
 - Agents
- Canopy type
- Sample types
- Sample unit types
- Basic tables
 - t-table
 - Product table
 - Countries

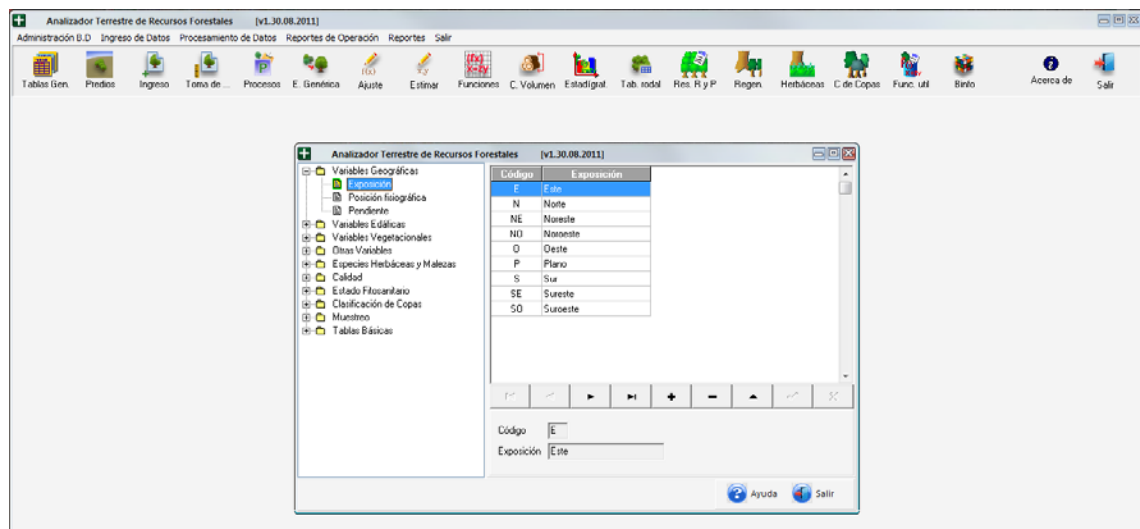
IMPORTANT

Each one of the General Tables may be managed (Add-Modify-Eliminate) through the system. In the Stand-alone version, changes will be made for one user only; in the Server version, changes will affect all users registered to work in the specific database.

The advantage of this model is that it allows each user to generate his or her own classification of variables, making the system more flexible.

Input Option

To make entries in General Tables select Database Administration, System Tables, and finally General; then click on Tables and select the required option with the mouse. A screen with the data entered into the system will appear.

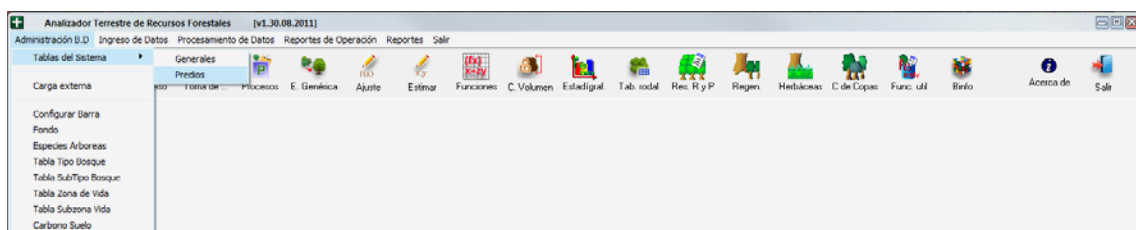


General System Tables Screen

IMPORTANT

Under current system specifications, Design Samples and Sample Unit Types cannot be added, as this would implicate other types of calculations not defined in the system.

5.2 Field Tables



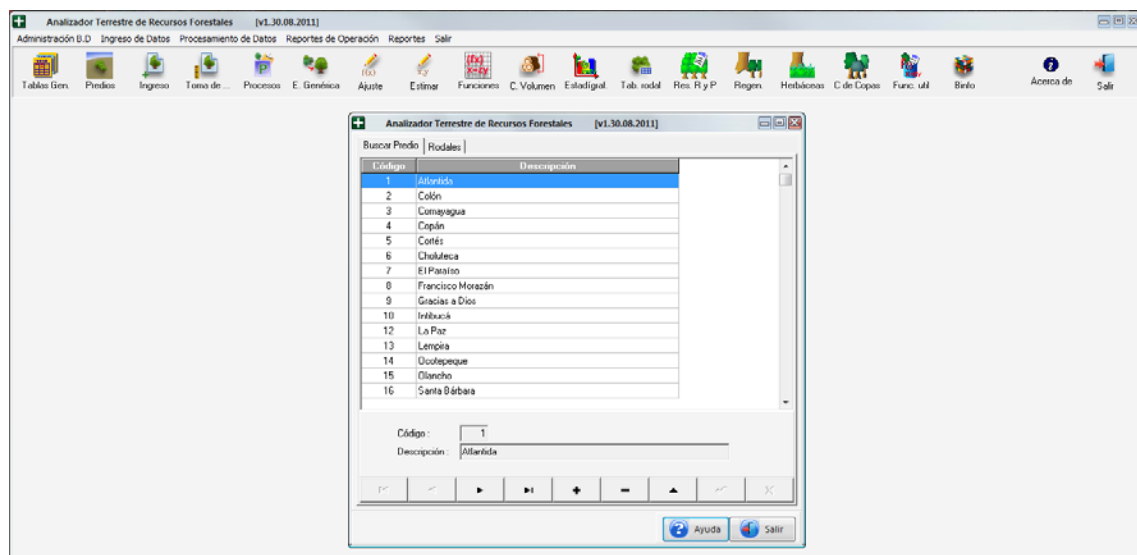
Field Tables are defined in this module. These tables contain the codification of fields to be processed, and the stands included in these fields.

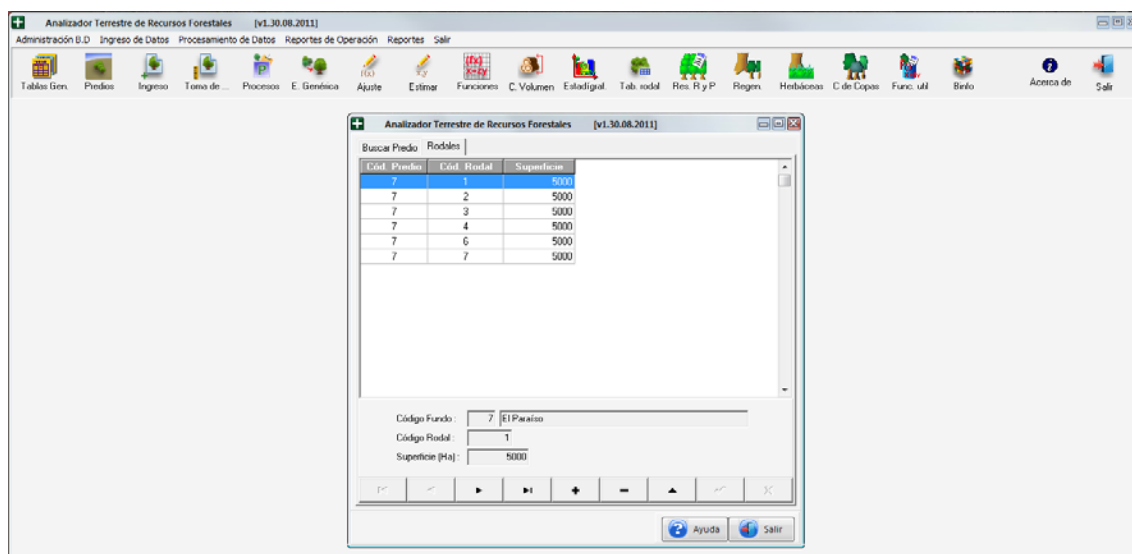
This option only allows for the incorporation of fields and stands of common use for any inventory. This codification must be maintained permanently, regardless of any new fields and stands included.

Choosing Options

To access Field Tables, select the *Database Administration, System Tables*, option, and then *Fields*. To do this, click on Tables and select the required options with the mouse. A screen with data input into the system will appear.

Field Tables screen, Fields selected



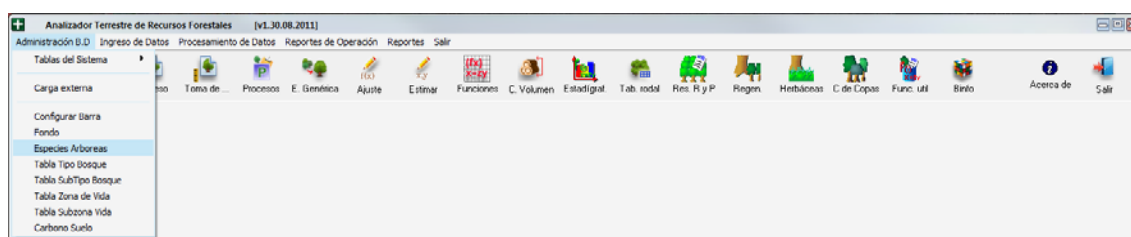


Field Tables screen, Stands selected

Procedure for Field Input

- Select the Field option on the main menu by clicking on it
- Use the Field window to add, modify, or eliminate fields in the system
- Click on the Stands option to open the window of stands associated to each field.

5.3 Tree Species



The Tree Species Table allows the user to manage (add, modify, eliminate) the tree species identified through forest inventories. This table includes the following data fields:

- Species code (numeric code assigned by user)
- Scientific name (scientific name of the species to be added)
- Common name (common name of the species to be added)
- Type (select species type: conifer or broadleaf)
- Endangered (selection associated to species characteristics: yes/no)
- Countries (select country or countries where the species is found)
- Associated Volume Function (select default volume function)
- Canopy BEF (%) (Biomass Expansion Factor for canopy and branches)

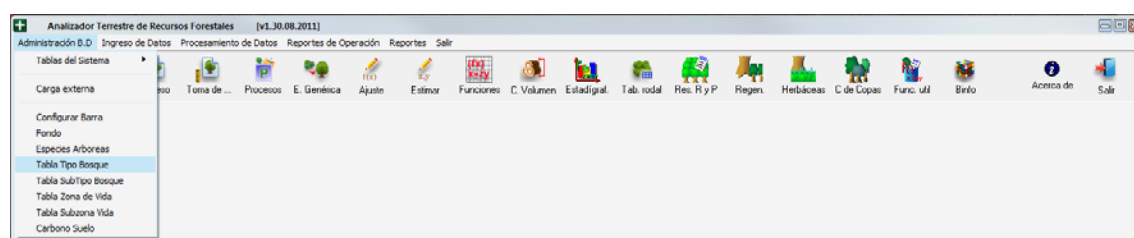
- Roots BEF (%) (Biomass Expansion Factor for roots)
- Average density (kg/m³) (Wood density of the species)
- Carbon fractions (%)
 - Trunk (carbon fraction for species trunk)
 - Canopy (carbon fraction for species canopy and branches)
 - Roots (carbon fraction for species roots)

Procedure for Entry of Tree Species Information

- In the main menu, select the *Database Administration* option, then select *Tree Species*.
- Use the *Tree Species* window to add, modify, or eliminate species in the system.
- Use the Tab key to move through the different data fields for each species. In fields that offer options for associated tables, select the corresponding option.
- Upon finishing data entry for each species, the user can open a new species file by pressing the Tab key. If no further species are to be entered in the system, press the Exit button.

Tree Species Table Screen

5.4 Forest Type and Sub-Type



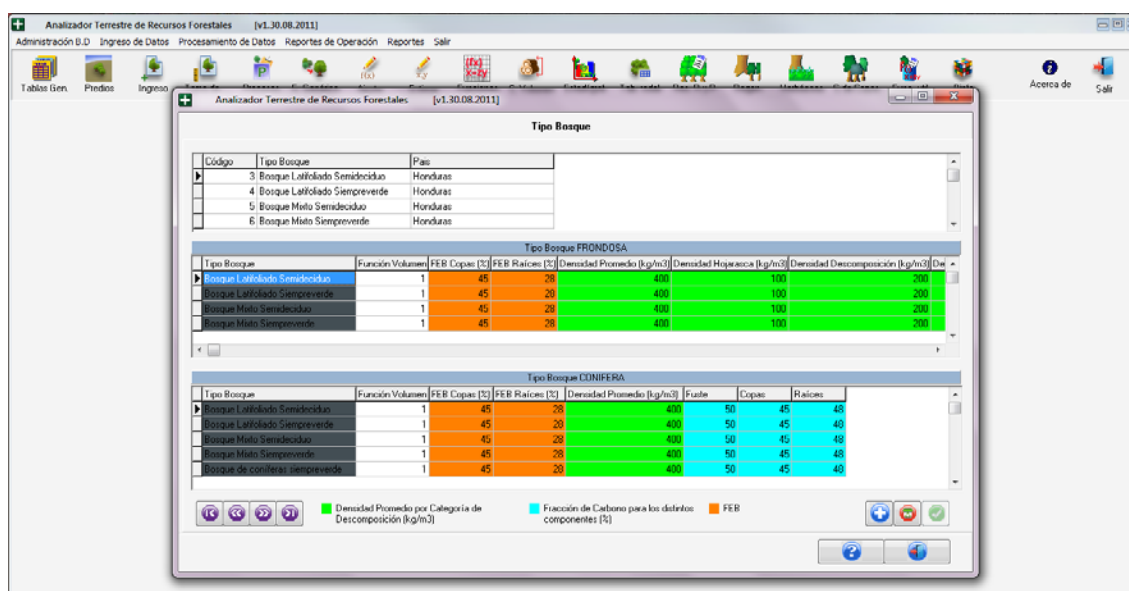
The Forest Type and Sub-Type Tables manage (add, modify, eliminate) the forest types and sub-types defined in each country. These tables include the following data fields:

- Forest type/sub-type code (numeric code assigned by the user)
- Forest type/sub-type (description of the corresponding type or sub-type)
- Country (country in which the forest type/sub-type is defined)
- Associated Volume Function (volume function to be used by default for coniferous or broadleaf species)
- Canopy BEF (%) (Biomass Expansion Factor for canopy and branches of coniferous or broadleaf species)
- Root BEF (%) (Biomass Expansion Factor for roots of coniferous or broadleaf species)
- Average density (kg/m³) (Wood density for coniferous or broadleaf species)
- Average litter density (kg/m³) (Litter density for forest type/sub-type)
- Decomposition density (kg/m³) (Density of decomposing wood for forest type/sub-type)
- Carbon Fraction (%)
 - Trunk (Carbon fraction for trunk of coniferous or broadleaf species)

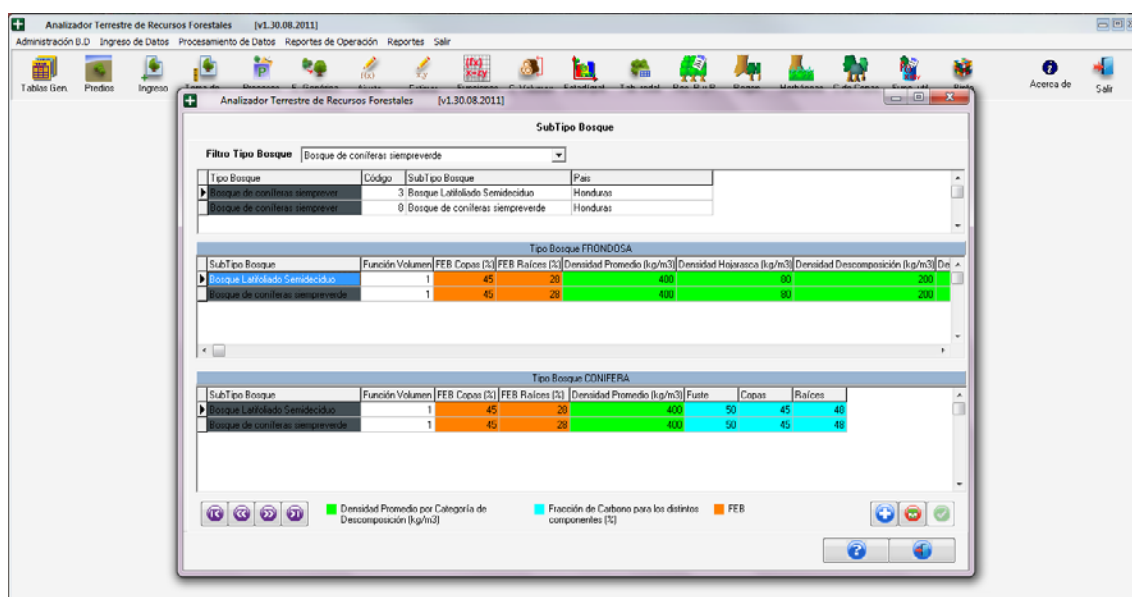
- Canopy (Carbon fraction for canopy and branches of coniferous or broadleaf species)
- Roots (Carbon fraction for roots of coniferous or broadleaf species)
- Intermediate dead wood (Carbon fraction for decomposing dead wood (intermediate) for the forest type/sub-type)
- Decomposed dead wood (Carbon fraction for decomposed dead wood for the forest type/sub-type)

Procedure for Entry of Forest Types/Sub-Types

- In the main menu select the **Database Administration** option, and choose the **Forest Type or Sub-Type** option.
- Use the **Forest Type/Sub-Type** window to add, modify, or eliminate types or sub-types in the system.
- Move through the different data fields for each type/sub-type using the Tab key. In those fields with options for Associated Tables, select the corresponding option.
- Upon finalizing data input for types/sub-types, press the Tab key to open a new entry. If no further entries are to be input, press the EXIT button.



Forest Type Table screen

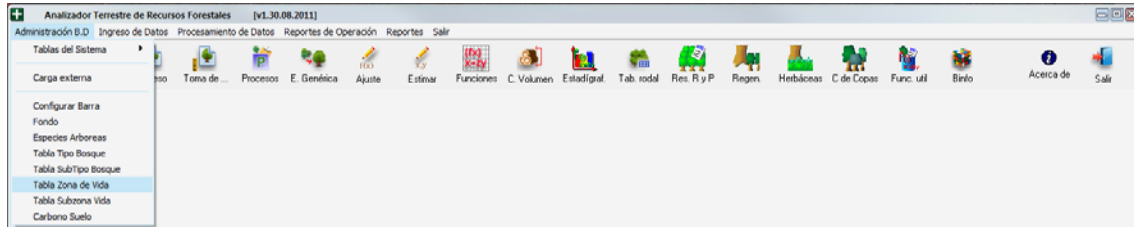


Forest Sub-Type Table screen

IMPORTANT

The Forest Type Table includes a generic entry that the system uses by default to perform calculations in the case that there is not sufficient information in the Forest Types/Sub-Types definition. This way, volume, biomass, and carbon results may be obtained from any data series.

5.5 Life Zone and Sub-Zone



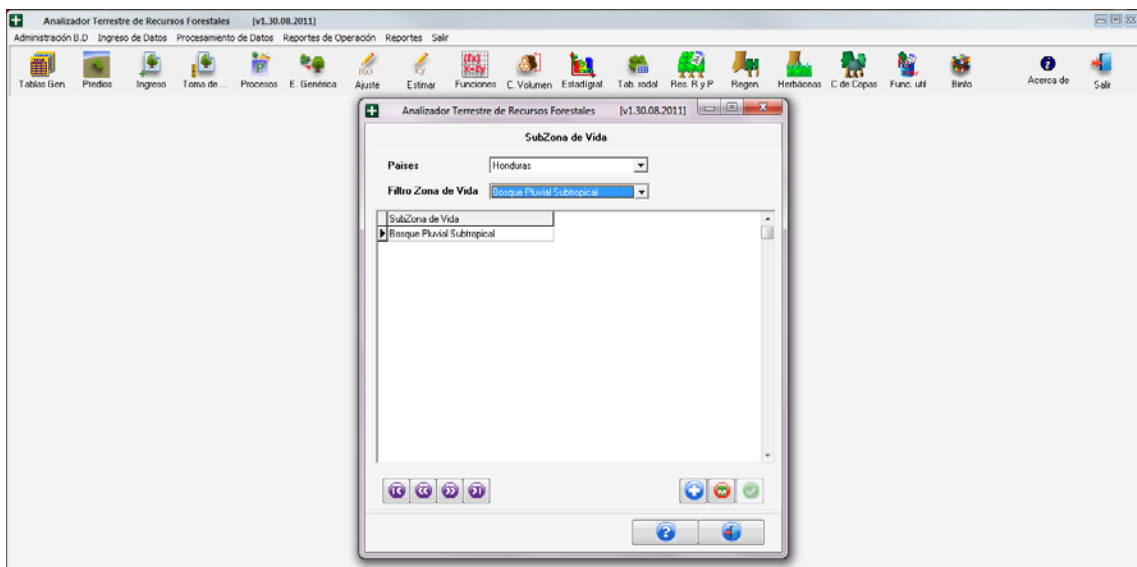
The Life Zone and Sub-Zone Tables allow the user to manage (add, modify, eliminate) the Life Zones and Sub-Zones defined in each country. These tables include the following data fields:

- Forest Type/Sub-Type Code (Numeric code assigned by the user)
- Life Zone/Sub-Zone (Description of the corresponding life zone or sub-zone)
- Country (Select country in which the life zone is defined)

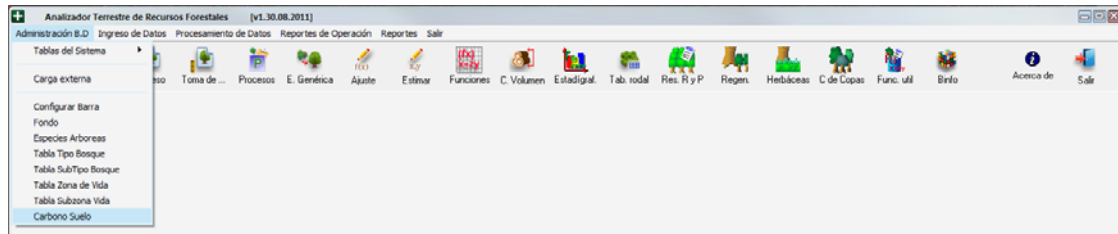
Procedure for input of Forest Type/Sub-Type Data

- In the main menu choose the *Database Administration* option, and then select the *Life Zone* or *Life Sub-Zone*.
- Use the *Life Zone/Sub-Zone* windows to add, modify, or eliminate zones or sub-zones in the system.
- Use the Tab key to move across the different data fields for each zone/sub-zone.
- When finished entering information for a type/sub-type, use the Tab key to open a new file, or if no further data is to be entered, simply press the EXIT button.

Life Zone Table screen



5.6 Soil Carbon

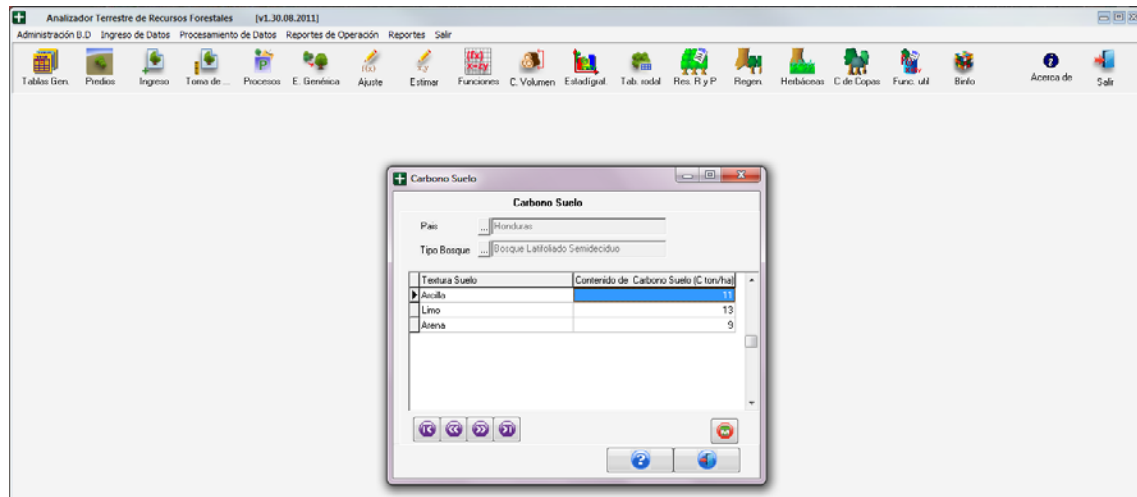


The Soil Carbon Table allows the user to manage (add, modify, eliminate) soil carbon values for each country, forest type, and soil texture. This table includes the following data fields:

- Country (select country in which the life zone is defined)
- Forest type (select corresponding forest type)
- Soil texture (select soil texture for which the carbon content is defined)
- Carbon content in the soil (C ton/ha) (carbon content for the given combination of forest type and soil texture)

Procedure to generate a Soil Carbon Content entry

- In the main menu select the **Database Administration** option, and then select **Soil Carbon**.
- Use the **Soil Carbon** window to add, modify, or eliminate soil carbon content in the system.
- Select the country and forest type, then for each soil texture input the content value for carbon, expressed in tons of carbon per hectare. Use the Tab key to move through the data fields for each soil texture selected.
- Upon finishing data input, use the Tab key to open a new file, or if no further entries are to be made, press the EXIT button.



Soil Carbon Table screen

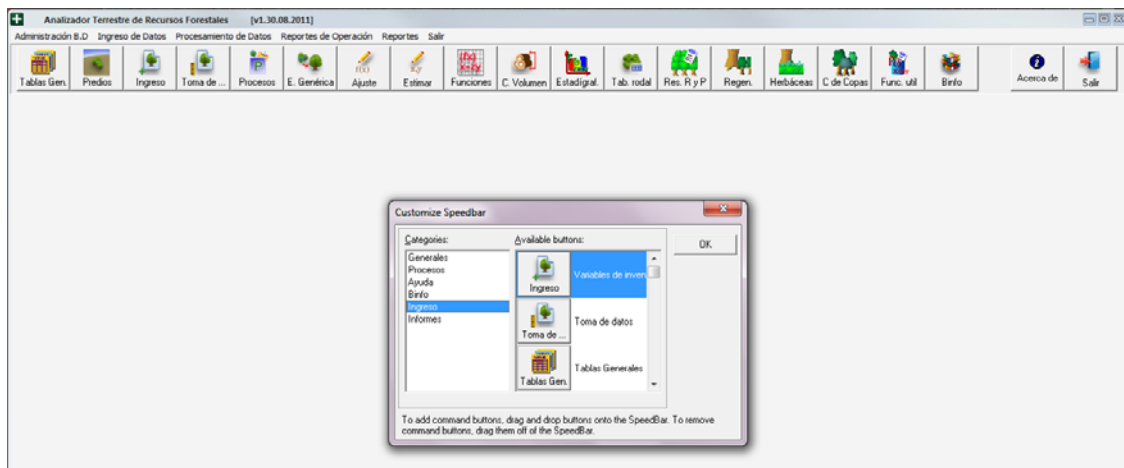
IMPORTANT

The soil carbon content values in the Soil Carbon Table will be used by default by the system if the values for this variable are not directly incorporated into Unit Samples. Laboratory values may be defined for each plot by examining a soil sample up to the first 30cm deep.

In summary, the System Tables module allows necessary codifications to be input so that the system may recognize the descriptions of a certain amount of variables; these variables can then be standardized to generate objective information that is comparable to prior processes.

5.7 Configure Toolbar

This option lets the user personalize the toolbar with the most often used direct access buttons. To configure the toolbar, drag the desired icons from the configuration window to the toolbar found just below the system's main menu.



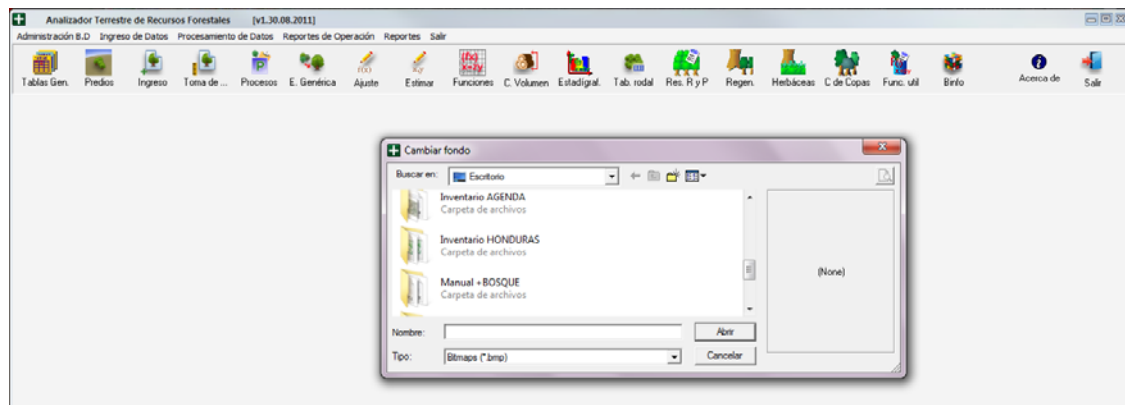
Toolbar configuration menu available under main menu

IMPORTANT

The toolbar configuration option allows the user to set a series of buttons to access menus directly from the icon bar depending on user needs and interests.

5.8 Background

This option lets the user establish a background image in the system's main menu.



System main menu background options screen

Procedure to change background:

- In the main menu select the Database Administration option and choose “Background.”
- In the Change Background window, select the background (any image file), click Open, and the system will automatically set the selected background image for the main menu screen.

Summary of Table, Function, and Factor Configuration Sequences in + Bosque

Task	Where?	Steps	What information is needed?
General Table Management	DB Administration – System Tables – General Tables – Specific Table	Each of the General Tables may be managed (add – modify – eliminate) through the system. In the Stand-alone version, changes will be made for the user only, while in the Server version, changes will affect all users registered to work in the specific database	Vegetation variables; edaphic variables; other variables; herbaceous species and weeds; quality; form; straightness; health; phytosanitary status; canopy type; sample type; unit sample types; t-table, products table, soil carbon content.

Manage Field and Stand Tables	DB Administration – System Tables – Fields	This option allows the user to incorporate common use fields and stands to any inventory. This codification must be maintained permanently, regardless of new fields and stands that may be incorporated.	Field (code and description); stand (code and surface area (ha))
Manage Tree Species Table	DB Administration – Tree Species	Manage (add – modify – eliminate) the Tree Species table in the system.	Species code, scientific name, common name, type, species, endangered?, volume function, BEF canopy, BEF roots, density, carbon fractions by component, country
Manage Forest Type and Sub-Type Tables	DB Administration – Forest Type (Forest Sub-Type)	Manage (add – modify – eliminate) the Forest Type and Sub-Type Tables in the system	Forest type (sub-type) codes, country, volume function, BEF canopy, BEF roots, densities, carbon fractions by component
Manage Soil Carbon Chart	DB Administration – System Tables – General Tables – Carbon by Soil Type	Manage (add – modify – eliminate) Soil Carbon Content Table	Country, forest type (forest sub-type) soil texture, soil carbon (kg/m ³)
Configure Wood Products	Data processing – Configure Products Table	Define products to be obtained from a determined species of tree. (a) Press “add” button, then enter configuration code and description and click accept; (b) Press button to define products and restrictions; (c) Press button to input weights for products for each species	Tree species, straightness, form, health, priority, diameter range, commercial height range, weight (value)
Manage Canopy and Branches BEF Table	DB Administration – BEF Canopy and Branches	Manage (add – modify – eliminate) the BEF Canopy and Branches Table	Tree species, diameter range, BEF
Manage regression models	Data Processing – Variable Models Manager f(DBH)	The Models Manager allows the user to incorporate multiple regression models with up to six coefficients, plus the intercepts with a model database. These models can then be adjusted with the sub-samples of desired variables.	Independent variables, dependent variables
Record volume functions	Data Processing – Record Volume Functions	This option allows the user to create volume functions to be applied to a process. These functions are defined for each species. Once the code and country for the function are entered, press the Function button found in the lower right corner of the window. This button presents a calculator specially built to generate volume functions.	Function code, country, technical information, volume function, associated tree species

6. DATA ENTRY



The Data Entry module allows information to be fed into the previous module with the data collected in the terrain. This way the data may be standardized, grouped, and stored appropriately from an IT standpoint.

This option on the menu presents three choices: Inventory Variables, Data Collection, and Processes.

Inventory Variables: Allows the user to access the inventory, its measurements, and associated fields and stands.

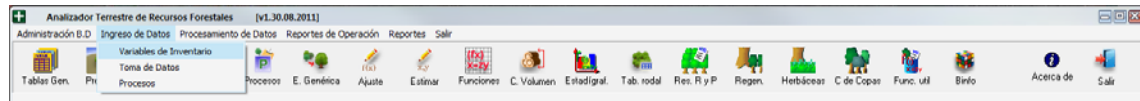
Data Collection: General information may be entered in the inventory, as well as dendrometric information (data from samples and sub-samples), and information on regeneration, herbaceous vegetation, dead wood, and litter, generated from incorporation of secondary and tertiary unit samples, line transects, and litter depth information, respectively.

Processes: This option allows the user to generate processes, selecting inventories, measurements, fields, stands, and plots for later analysis.

IMPORTANT

The system has two options for data loading. The first option is to input directly through formats available in the Inventory Variables and Data Entry selections, and the second option is to use a pre-designed Excel worksheet to import the data into the system. Data entry through the system formats is described below, and later in this chapter guidelines are provided for data entry through Excel worksheets.

6.1 Inventory Variables



This option allows the user to incorporate forest inventories into the system, entering all of the necessary identification and characterization data.

Each format for this option is identified and described below, along with the data entry process:

Inventory

The Variables option allows the user to keep make a detailed entry of the attributes of each inventory input into the system; new inventories are added through this function. Inventory characteristics are defined with the following information:

- Inventory (inventory code – description)
- Field (field code – description)
- Date
- Stand
- Sample design
- Type of sample unit
- Measurement
- Period
- Conglomerates

The **Inventory Code** is a number that the user assigns; the **Description** is an alphanumeric field associated to the code that allows the user to identify the inventory with greater specificity. The **Date** is the date of data collection in the terrain.

The **Sample Design** of the inventory, in keeping with system options, may be:

- Simple Random Sample
- Systematic Sample
- Stratified Sample

In practical terms, the difference between these designs lies in the way that Standard Deviation associated with the sample is calculated.

The **Types of Sample Units** that may be defined through this software are:

- Conventional Sample Units
- Bitterlich Sample Units
- Prodan Sample Units

The definition of each unit sample type will impact the calculations for basic surface inventory variables. That is, unit sample type definitions will affect the expansion factors used to infer population levels from sample units.

The **Measurement** attribute was included as a reference in case the same inventory is done two or more separate times; this inventory may be measured differently each time if needed.

The **Period** variable refers to the time period in years for the increase in diameter measurements. This variable can be used later in the estimation of volumetric growth in the sampled area through the inventory. This period is unique to the inventory and its associated fields and stands.

The **Conglomerates** field allows the user to input the number of plots in each conglomerate in the case that the inventory has been designed under this format and methodology. For calculation purposes, the system will use this field to process sample units as secondary plots within a main plot.

To access the inventory, the user must select the **Data Entry** option from the menu, and select **Inventory Variables**, and click on the desired option. This will display a screen with the data already entered into the system.

Inventory definition screen

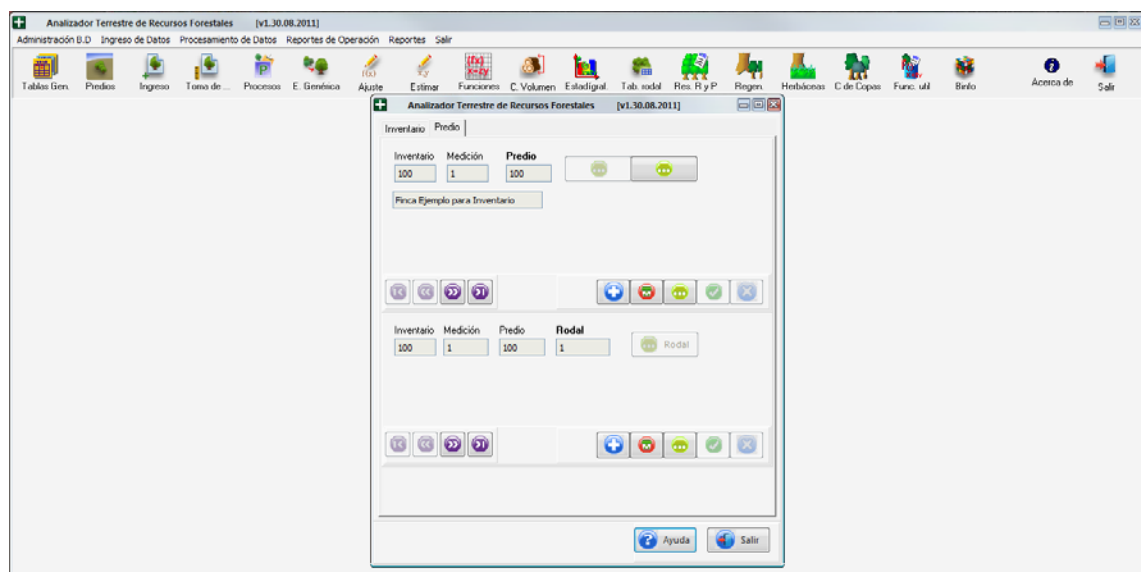
Procedure to Open the Inventory Screen

- In the main menu, select the Data Entry option
- This menu presents the following options: Inventory Variables, Data Entry, and Processes. Select the Inventory Variables option by clicking on it.
- Inventory Variables presents two options in the upper part of the screen: Inventory and Field. Select the Inventory option.
- In this window, select Add by clicking on it
- Enter the requested information and click the Accept button once the information has been entered, or click Cancel if you do not wish to record the data.
- To enter the measurements of the inventory go to the lower toolbar and click on the Add option.

- Enter the requested information and click the Accept button once the information has been entered, or click Cancel if you do not wish to record the data.
- Exit the window by clicking on the Exit button.

6.2 Field

The Field screen presents options for fields and stands to be associated to the inventory created. Both (fields and stands) come from the System Tables where they were entered and defined.



Fields and Stands Manager screen

Procedure to Enter Fields and Stands in an Inventory:

- To associate fields and stands to an inventory, select the Field option from the window.
- In this window, select the Add option found in the central toolbar of the screen.
- Enter the requested data (field code) and click Accept once the data has been added, or click Cancel if you do not wish to record the data.
- Enter the corresponding stands for each added field.
- In the lower toolbar select the Add option.
- Enter the requested data (stand code) and click Accept once the data has been added, or click Cancel if you do not wish to record the data.
- To exit the application, click the Exit button.
- The Options button on the Field screen allows the user to select an existing field in the database, while the Add button lets the user add a field and stand not yet registered in the database.
- The Options button on the Stand screen allows the user to select an existing stand in the database.

6.3 Data Entry – System Formats



This option lets the user record basic variables information from data collection, dendometric information, and data on regeneration, herbaceous species, dead wood, and litter.

The windows for this option and their respective attributes are listed below, as well as the procedure for data entry. The options for data entry are:

- General
- Trees
- Regeneration
- Herbaceous Vegetation
- Dead Wood
- Litter

Window: General

General information refers to information that is common across the Sample Unit, such as:

- Sample unit surface area (m²)
- UTM coordinates (X and Y)
- Team leader
- Aerial photographs
 - Flight line

- Photograph numbers
- Measurement date
- Execution timeline
- Transfer timeline
- Start time
- End time
- Physiographic characteristics
 - Exposure
 - Slope
 - Physiographic position
 - Altitude
- Edaphic characteristics
 - Rock type
 - Soil type
 - Soil texture
 - Soil structure
 - Soil depth
 - pH reaction
 - Drainage
 - Soil series
 - Soil carbon content (C ton/ha)
- Vegetation characteristics
 - Forest type
 - Forest sub-type
 - Life zone
 - Life sub-zone
 - Development status
 - Origen
 - Structure
 - Composition
 - Understory coverage
 - Understory type
- Other characteristics
 - Natural monument
 - Strategic areas (1 to 5)
 - Distance to roads
 - Road type
 - Road quality

Most of the variables identified here are coded in the system's General Tables, facilitating easy input. The system has fields that contain the codes and descriptions for data input where required. Alternately, codes may be input alone without accessing these system-generated suggestions.

Accessing Data Input

To open data input screens, chose the Data Input option from the menu, and then Data Entry. This will display the screen to enter all of the information associated with data collection from forest inventories.

This window allows the user to add, modify, or eliminate the basic variables on a Primary Sample Unit level.

Analizador Terrestre de Recursos Forestales [v1.30.08.2011]

Administración B.D. Ingreso de Datos Proceso

Analizador Terrestre de Recursos Forestales [v1.30.08.2011]

Toma de Datos

Tipo Unidad Muestral Diseño Muestral Inventario Medición Predio Rodal UIMP

Unid_Muestral L Tipo_Muestreo 100 1 100 1 211.00 [Ha] 1

General Arboles Regeneración Herbáceas Maderas Muestras Hojassecas

Superficie [m2] 500

Coordenadas (UTM)

Latitud 0 Longitud 0

N° Fotografía

Linea Foto

Fecha Medición

Día Mes Año

1 9 2011

Características Geográficas

Pendiente

Exposición Posición Código Grados %

1 2 3 3-6 5-10

Altitud (mm) 120

Tiempo de Ejecución

Tiempo de Traslado (min) Hora Término Hora Inicio

0 0 0 0

Características Edáficas

Tipo Roca Tipo Suelo Textura Estructura pH Profundidad Drenaje Serie Contenido de Carbono Suelo (C ton/ha)

1 1 2 1 2 2 1 11

Características del Rodal

Tipo Bosque SubTipo Bosque

Bosque de coníferas siempreverde Bosque Latifoliado Semideciduo

Zona Vida Sub Zona Vida

Bosque Húmedo Subtropical (cálido) Bosque Húmedo Subtropical (cálido)

Estado Desarrollo Origen Estructura Composición Subbosque Tipo Subbosque Monum. Natural Recreación

6 3 2 2 2 2 1 1

Dist. Camino Tipo Camino Estado Camino

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2064 2065

Procedure to Add Information from General Data Collection

- Once in the system, click on the Data Input and Data Entry option from the menu
- In the Data Entry window, the General, Trees, Regeneration, Herbaceous Species, Dead Wood, and Litter options are found in the upper left corner. Choose General.
- Press the Add button, and the system displays a selection of inventories for the user to select the inventory on which he or she wishes to work
- In the General window, enter the basic variables data for the sample unit as per the attribute specifications described in the manual, for example: surface area, coordinates, image, etc.
- Once the data is entered click Accept if the information is correct.
- Additionally, in the upper part of the window, options are available for Inventory, Measurement, Stand, and Plot. These options allow the user to select a specific inventory from the database.

Window: Trees (Sample and Sub-Sample)

Once the general situation has been described, dendrometric information can be added. This information is divided in two levels:

- Sample (upper part of the screen)
- Sub-sample (lower part of the screen)

The following variables may be entered for each Primary Sample Unit:

- Tree (alpha-numeric)
- Species (table)
- Diameters 1.3 m
 - DBH 1 (cm)
 - DBH 2 (cm)
- Phytosanitary status
 - Agents (table)
 - Signs or symptoms (table)
- Canopy type (table)
- Dead (Y/N)
- Azimuth (°)
- Distance (m)
- Quality
 - Straightness (table)
 - Form (table)
 - Health (table)
- Defaults
 - Length default 1 (cm)
 - Height default 1 (m)
 - Length default 2 (cm)
 - Height default 2 (m)
- Auxiliary variables

- Auxiliary variable 1 (numeric value if defined in the inventory)
- Auxiliary variable 2 (numeric value if defined in the inventory)
- Auxiliary variable 3 (numeric value if defined in the inventory)

This information describes the basic characteristics of each tree included in the Primary Sample Unit; these attributes are stored to be used later in related processing.

Data Entry screen for sample and sub-sample trees from the Sample Unit

Procedure for Entering Information Related to the Sample:

- Once in the system, click on the Data Entry option.
- In the Data Entry window, options appear in the upper left for General, Trees, Regeneration, Herbaceous Species, Dead Wood, and Litter; choose the Trees option.
- In the Trees window (upper part) enter the data associated to tree information as per the attributes described in the manual, for example: tree, species, DBH 1, etc.
- The system provides reference data boxes with information on species, agents, symptoms, canopy type, straightness, form, and health; the user may click on the ▼ symbol and select the specific information, then click Accept.


On the **Sub-Sample** level (lower part of the same Trees screen), information linked to the sample trees used to build the regression variables in function of DBH will be shown: total height, commercial height, canopy coverage, age, and growth. All of the dependent variables mentioned are difficult to obtain directly; as a result they are estimated based on adjusted functions from data generated by the inventory itself.

The variables to be entered into the sub-sample are:

- Tree (alpha-numeric or associated to the sample)
- DBH 3 (mm) (direct entry or generated by the sample information)

- Species (table) (direct entry or generated by the sample information)
- Height
 - Total (m)
 - Commercial (m)
- Canopy coverage
 - Northern radius (m)
 - Southern radius (m)
 - Eastern radius (m)
 - Western radius (m)

Procedure to Add Information Associated to Sub-Samples:

- Once in the system, click on the Data Entry option
- In the Data Entry window, options appear in the upper left for General, Trees, Regeneration, Herbaceous Species, Dead Wood, and Litter; choose the Trees option.
- In the Trees window (lower part), enter the data associated to tree information as per the attributes described in the manual, for example: tree, species, DBH 1, etc.
- The system provides reference data boxes with information on species, agents, symptoms, canopy type, straightness, form, and health; the user may click on the  symbol and select the specific information, then click Accept.

Window: Regeneration

This window allows the user to add, modify, or eliminate information linked to Secondary Sample Units (SSU) used to characterize and quantify information on regeneration in the measurement area.

The Secondary Sample Units (SSU) collect the following variables in order to describe tree regeneration present in an area established by the Primary Sample Unit (PSU):

- Secondary Sample Unit number (alpha-numeric)
- Surface area of the Secondary Sample Unit (m²)
- Individual sequential number (numeric)
- Tree species (table)
- Plant height (cm)

Procedure to Add Regeneration Information (Secondary Sample Unit):

- Once in the system, click on the Data Entry option.
- In the Data Entry window, options appear in the upper left for General, Trees, Regeneration, Herbaceous Species, Dead Wood, and Litter; choose the Regeneration option.
- Enter the requested data as per the specified attributes described in the manual, including tree species, height, etc. The system assigns a sequencing number to the SSU and reference window. A list of species types is provided and the user may select the desired information and click Accept.
- Once the data is entered in the system, click Accept if the information is correct.

Analizador Terrestre de Recursos Forestales [v1.30.08.2011]

Administración B.D. Ingreso de Datos Procedimientos

Analizador Terrestre de Recursos Forestales [v1.30.08.2011]

Toma de Datos

Tipo Unid. Muestral Diseño Muestral Inventario Medición Predio Rodal UMP
 Unid_Muestral LTipo_Muestreo T100 T100 T1 211.00 (Ha) T1

General Árboles Regeneración Herbáceas Modales Muestras Hojaasaca

Unidad Muestral Secundaria

UMS Superficie (m2)
 T1 3.14

Alturas de especies presentes en la UMS

Correlativo	Especie Arbórea	Nombre Científico	Altura (cm)
E1 (301)		E1	240
E2 (302)		E2	120
E3 (303)		E3	45

Ayuda Salir

Regeneration Data Entry screen for Secondary Sample Unit

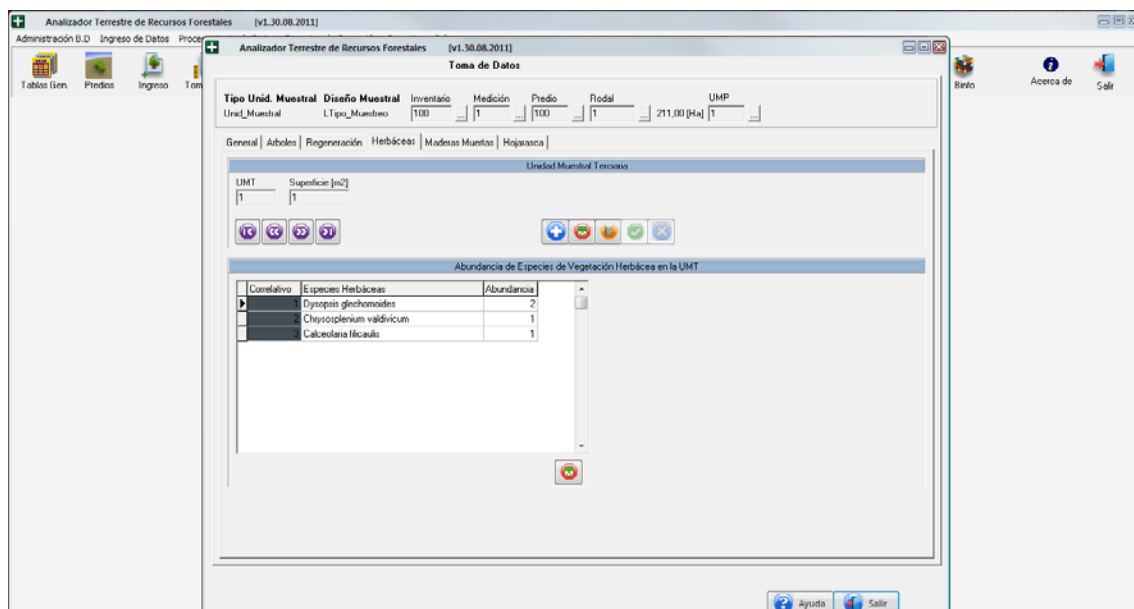
Window: Herbaceous Species

The Tertiary Sample Units (TSU) allow the user to identify the presence of herbaceous species and/or weeds in the PSU area. The variables involved in the TSU are:

- Tertiary Sample Unit number (alpha-numeric)
- Surface area of the Tertiary Sample Unit (m²)
- Sequence number for the herbaceous species or weeds (auto-numbering)
- Herbaceous species or arboreal weeds (table)
- Abundance (number of individuals of the species)

Procedure to Add Information on Tertiary Sample Unit Regeneration:

- Once in the system, click on the Data Entry option
- In the Data Entry window, options appear in the upper left for General, Trees, Regeneration, Herbaceous Species, Dead Wood, and Litter; choose the Herbaceous Species option.
- Enter the surface area. The system assigns a sequencing number to the corresponding TSU.
- Enter the requested data as per the specified attributes described in the manual. The abundance sequence number is assigned automatically; the herbaceous species may be selected from a list by selecting the data and clicking Accept. Enter the abundance.
- Once the data is entered in the system, click Accept if the information is correct.



Data Entry screen for Herbaceous Species in the Tertiary Sample Unit

Window: Dead Wood

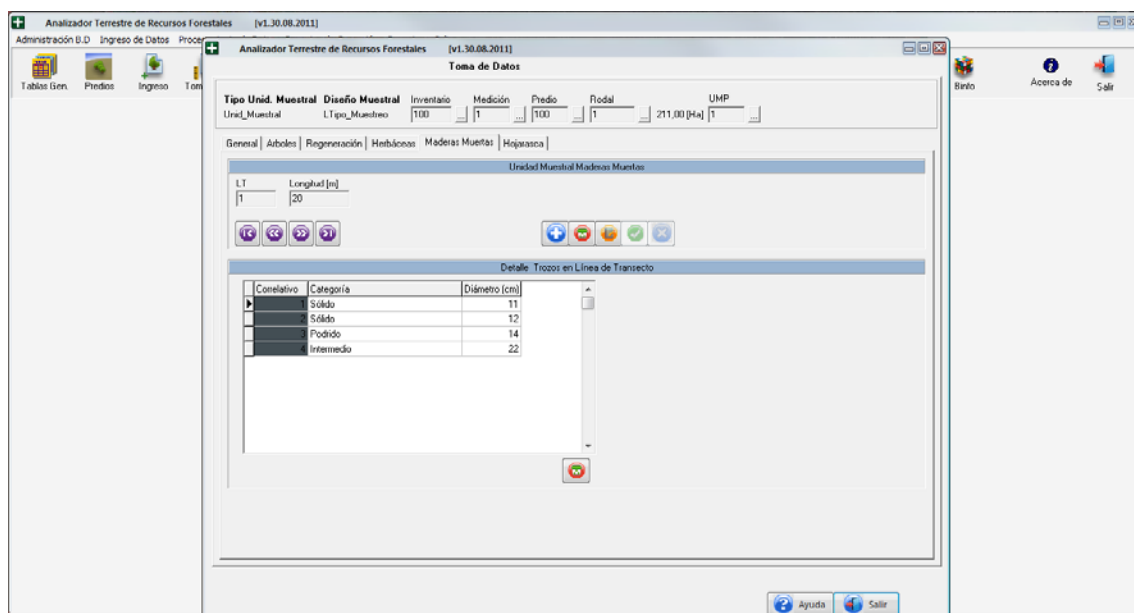
This window allows the user to add, modify, or eliminate information related to Line Transects (LT) used to characterize and quantify information on the presence of dead wood in the inventory area.

Line transects collect the following variables in order to identify the presence of dead wood in the area established by the PSU:

- Line transect number (alpha-numeric)
- Line transect length (m)
- Fallen section number (sequential, auto-numbering)
- Decomposition category (table)
- Fallen section diameter (cm)

Procedure to add a Line Transect

- Once in the system, click on the Data Entry option
- In the Data Entry window options appear in the upper left for General, Trees, Regeneration, Herbaceous Species, Dead Wood, and Litter; choose the Dead Wood option.
- Enter the length of the TL. The system assigns a sequencing number to the corresponding TL automatically.
- Enter the requested data as per the specified attributes described in the manual. The fallen section number is assigned automatically by the system; decomposition classification is selected from a list by clicking on the field, selecting the desired category, and clicking Accept. Enter the diameter of the section.
- Once the data is entered in the system, click Accept if the information is correct.



Data Entry screen for dead wood in the line transect

Window: Litter

This window allows the user to add, modify, or eliminate information related to depth measurements of tree litter used to quantify information on the volume of litter existing in the sample area.

In the Litter window, the depth of the litter layer is identified in a maximum of four measurement points, with a maximum of three measurements per point, in order to define the volume of litter in an area established in the PSU.

Additionally, litter density is recorded (if available) in kg/m^3 , to then calculate litter biomass.

Procedure to Add a Line Transect

- Once in the system, click on the Data Entry option
- In the Data Entry window, options appear in the upper left for General, Trees, Regeneration, Herbaceous Species, Dead Wood, and Litter; choose the Litter option.
- Enter the litter depth for the available measurement points and the corresponding measurements. The system will perform the calculations with the available values; it is not necessary to fill all of the data fields in depth measurements.
- Once the data is entered in the system, click Accept if the information is correct.

Data Entry screen for litter depth

IMPORTANT

The SSU, TSU, TL, and Litter options may be included in varying quantities within the PSU depending on the needs of the inventory designer. They may also be left out, which would simply lead to the unavailability of conclusions regarding these elements: (regeneration, herbaceous species, dead wood, and litter).

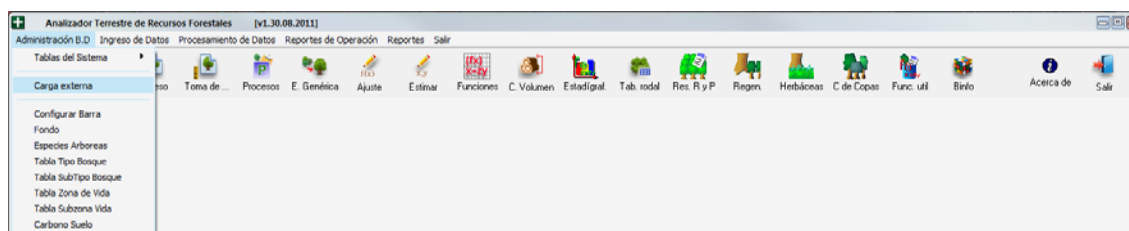
Methodological Summary for Data Entry in +BOSQUE: Direct Entry in System Formats

Sequence	Where?	What to do?	What information?
----------	--------	-------------	-------------------

Step 1	Data Entry - Inventory Variables	- Enter inventory information to be incorporated into the system	Inventory (inventory code - description); field (field code - description); date; stand; sample design; sample unit type; measurement; period
Step 2	Data Entry - Inventory Variables - Field	- In the Field screen select the field and stands associated to the inventory created; both (fields and stands) come from the System Tables where they were entered and defined	Field (field code - description); stand; stand surface area (ha)
Step 3	Data Entry - Inventory Variables - Field/Stand	- Enter the stands corresponding to each field entry	Stand; stand surface area (ha)
Step 4	Data Entry - General	- General information is common across all of the sample units	Surface area of the sample unit (m ²); UTM coordinates (X and Y); team leader; aerial photographs; flight line; photograph numbers; measurement date; implementation time; transfer time; start time; end time; physiographic characteristics, edaphic characteristics, vegetation characteristics, other characteristics
Step 5	Data Entry - Trees (Sample)	- Once the general situation has been described, dendrometric information may be entered on two levels: sample and sub-sample. Sample (upper part of the screen)	Tree (auto-numbering); species (table); DBH 1 (mm); DBH 2 (mm); Agents (table); signs or symptoms (table); canopy type (table); dead (Y/N); azimuth (°); distance (m); straightness (table); form (table); health (table); default length 1 (cm); default height 1 (m); default length 2 (cm); default height 2 (m)
Step 6	Data Entry - Trees (Sub-sample)	- Sub-sample (lower part of the screen)	Tree (auto-numbering or associated to the sample); DBH 3 (mm) (direct entry or taken from the sample); species (table) (direct entry or taken from the sample); total height (dm); commercial height (dm); Northern radius (m); Southern radius (m); Eastern radius (m); Western radius (m); increase in radius (mm) (in the period (years) defined for the inventory); bark thickness (mm); age (years)
Step 7	Data Entry - Regeneration	- Allows the user to add, modify, or eliminate information linked to Secondary Sample Units (SSU) to characterize and quantify information on regeneration in the measurement area	Secondary Sample Unit number (alpha-numeric); surface area of the Secondary Sample Area (m ²); individual sequence number (auto-numbering); tree species; table; plant height (cm)

Step 8	Data Entry - Herbaceous Species	The Tertiary Sample Units (TSU) allow the user to identify the presence of herbaceous species and/or weeds in the PSU area	Tertiary Sample Unit number (alpha-numeric); surface area of the Tertiary Sample Unit (m2); sequence number of the herbaceous species or weed (auto-numbering); herbaceous species or arboreal weeds (table); abundance (quantity of individuals of the species)
Step 9	Data Entry - Dead Wood	This window allows the user to add, modify, or eliminate information regarding line transects (LT) in order to characterize and quantify information on the presence of dead wood in the inventory area	Number of line transects (numeric); length of line transects (m); fallen section sequential number (auto-numbering); decomposition category (table); diameter of fallen section (cm)
Step 10	Data Entry - Litter	This window allows the user to add, modify, or eliminate information regarding depth measurements of tree litter in order to quantify the information on litter volume existing in the sample area	The Litter window identifies the depth of the litter layer in a maximum of four measurement points, with a maximum of three measurements per point, in order to define the volume of litter in the established area in the PSU.

6.4 Data Entry – Excel Worksheets



This option, found under *Database Administration Menu – External Upload*, allows the user to incorporate inventory information with all of the variables described previously into the system from an Excel worksheet previously configured for this purpose.

The Excel worksheet for data import into the system has a series of sheets with reference colors for the user to add inventory information.

KEY	Cod_INV	SUP_INV	GLOSA_INV	FECHA_IN	TIPO_U	DISEN	VA
2	555-1-2	555	1,0 Inventario Honduras	25-02-2006	1	1	1
3	555-1-3	555	1,0 Inventario Honduras	25-02-2006	1	1	1
4	555-2-1	555	1,0 Inventario Honduras	25-02-2006	1	1	1
5	555-3-1	555	1,0 Inventario Honduras	25-02-2006	1	1	1
6	555-3-3	555	1,0 Inventario Honduras	25-02-2006	1	1	1
7	555-3-4	555	1,0 Inventario Honduras	25-02-2006	1	1	1
8	555-3-5	555	1,0 Inventario Honduras	25-02-2006	1	1	1
9	555-3-6	555	1,0 Inventario Honduras	25-02-2006	1	1	1
10	555-4-3	555	1,0 Inventario Honduras	25-02-2006	1	1	1
11	555-4-6	555	1,0 Inventario Honduras	25-02-2006	1	1	1
12	555-5-4	555	1,0 Inventario Honduras	25-02-2006	1	1	1
13	555-6-2	555	1,0 Inventario Honduras	25-02-2006	1	1	1
14	555-7-1	555	1,0 Inventario Honduras	25-02-2006	1	1	1
15	555-7-2	555	1,0 Inventario Honduras	25-02-2006	1	1	1

Each worksheet has a different color for variables to be located more easily. The available pages are:

- STANDS (blue)
- PLOTS (red)
- TREES (green)
- SUB-SAMPLE (grey)
- REGENERATION (purple)
- HERBACEOUS SPECIES (light blue)
- DEAD WOOD (orange)
- LITTER (brown)

The name of each variable is found at the head of each column, and a text box appears explaining the meaning of each one and the units of measurement when appropriate.

The screenshot shows an Excel spreadsheet titled 'El Paraiso'. The data table has the following columns: SUP, INV, GLOSA, INV, FECHA, TIPO, L, M, MEDICIO, PERIOD, COD, PRED, DES, PREDIO, ROD, SUP, ROD, PAIS. The 'TIPO' column (column F) is highlighted with a yellow background. A text box is overlaid on the spreadsheet, explaining the 'TIPO' column: 'Corresponde al Tipo de Unidad. El sistema cuenta con tres opciones: Convencional, Bitterlich y Proden.' The spreadsheet also shows a status bar at the bottom with various statistics and a comment: 'Celda F1 comentada por Mario Gaete'.

STAND: Excel worksheet for data import into the system, showing an informational text box explaining a particular column.

STANDS (blue)

The STANDS worksheet is designed to incorporate general information on the inventory's fields and stands. In the upper left corner of this worksheet, the EXPORT WORKSHEET button allows the user to save the file in an Excel (.xls) format in a separate folder to later be uploaded to +Bosque.

FIELD_DES	Field Description. Corresponds to an alpha-numeric field that identifies the Field in question (farm, property, administrative division, zone, region, or province). For example: "Forest Reserve XXXXXXXXX"
STAND	Stand Code. Numeric value that identifies the stand (sector, area, zone, etc.) within a field. Must be greater than 0 and have a maximum of 4 digits.
SURF_STAND	Corresponds to the surface area in hectares of a stand (sector, area, zone, etc.) Surface area must be specified down to two decimal points.
COUNTRY	Country Code. Numeric value that identifies the country in which the inventory has been performed.
Conglomerate	Total number of plots: Corresponds to the number of plots included in each conglomerate defined in the inventory. If the inventory does not use the conglomerate model then the value entered should be 1.

PLOTS (red)

The PLOTS worksheet includes all of the feasible variables, including general information on the sample unit, vegetation, and geographic, physiographic, and edaphic data.

F296		500499																																					
1	KEY	COD	RODAL	KEY	PARCELA	NUM	UMP	SUP	UMP	E	F	G	LEY	TIPO	BOSQUE	SUB	TIPO	BOSQUE	ZONA	VIDA	SUB	ZONA	VIDA	ENCARGADO	FECHA	UMP	N	O	P	PEND	ALTITUD	TRASLADO	Q	R	R	H	I		
280	555-8-1	1	555-8-1-1553	1553	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	24-01-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
281	555-8-1	1	555-8-1-1554	1554	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	24-01-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
282	555-8-2	2	555-8-2-1031	1031	5000	5E+05	2E+06	8.0	8.0	3.0	3.0	1	10-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
283	555-8-2	2	555-8-2-1032	1032	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	10-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
284	555-8-2	2	555-8-2-1033	1033	5000	5E+05	2E+06	8.0	8.0	3.0	3.0	1	10-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
285	555-8-2	2	555-8-2-1034	1034	5000	5E+05	2E+06	8.0	8.0	3.0	3.0	1	10-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
286	555-9-2	2	555-9-2-803	803	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	04-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
287	555-8-2	2	555-8-2-804	804	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	04-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
288	555-8-3	3	555-8-3-1281	1281	5000	5E+05	2E+06	8.0	8.0	3.0	3.0	1	26-01-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
289	555-8-3	3	555-8-3-1283	1283	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	26-01-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
290	555-8-3	3	555-8-3-1284	1284	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	26-01-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
291	555-8-3	3	555-8-3-1871	1871	5000	5E+05	2E+06	16.0	16.0	8.0	8.0	1	15-07-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
292	555-8-3	3	555-8-3-1872	1872	5000	5E+05	2E+06	16.0	16.0	8.0	8.0	1	14-07-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
293	555-8-3	3	555-8-3-1873	1873	5000	5E+05	2E+06	16.0	16.0	8.0	8.0	1	14-07-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
294	555-8-3	3	555-8-3-251	251	5000	5E+05	2E+06	16.0	16.0	8.0	8.0	1	24-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
295	555-8-3	3	555-8-3-252	252	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	24-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
296	555-8-3	3	555-8-3-253	253	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	24-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
297	555-8-3	3	555-8-3-254	254	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	24-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
298	555-8-4	4	555-8-4-232	232	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	08-03-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
299	555-8-4	4	555-8-4-234	234	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	08-03-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
300	555-8-4	4	555-8-4-361	361	5000	4E+05	2E+06	16.0	16.0	3.0	3.0	1	18-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
301	555-8-4	4	555-8-4-362	362	5000	4E+05	2E+06	16.0	16.0	3.0	3.0	1	18-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
302	555-8-4	4	555-8-4-363	363	5000	4E+05	2E+06	16.0	16.0	3.0	3.0	1	17-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
303	555-8-4	4	555-8-4-384	384	5000	4E+05	2E+06	16.0	16.0	3.0	3.0	1	17-02-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
304	555-8-4	4	555-8-4-381	381	5000	5E+05	2E+06	16.0	16.0	3.0	3.0	1	04-03-2006	N	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499	
F296		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499		500499			

PLOTS Excel worksheet for external data import into the system

The following variables are included in the PLOTS worksheet:

KEY_PLOT	A key used in conjunction with the inventory codes for fields and stands. This field is automatic and does not need to be filled in.
STAND_COD	Stand Code: Numeric value that identifies the stand (sector, area, zone, etc.) in a field. Must be greater than 0 and have a maximum of “N” digits.
PSU_NUM	Primary Sample Unit Number (Plot): Corresponds to the plot or Primary Sample Unit number. In this unit the sample and sub-sample trees will be measured. A whole number must be input for this cell.
PSU_SURF	Surface Area of the Primary Sample Unit (Plot). A whole number value in m ²
AXIS_X	Geographic Latitude Coordinate. Corresponds to the latitude of the central point of the Primary Sample Unit. Value input in decimals. Decimal value = degrees + (minutes/60) + (seconds/3600).
AXIS_Y	Geographic Longitude Coordinate. Corresponds to the longitude of the central point of the Primary Sample Unit. Value input in decimals. Decimal value = degrees + (minutes/60) + (seconds/3600).
LEAD	Identification of measurement leader. This corresponds to an alpha-numeric field where the user may identify the person in charge of the measurements. Enter a name or identification code.

DATE_PSU	Date of the measurement of the Sample Unit (plot). This is the <u>date in which the plot was cordoned and measured</u> . Example: 10/06/2011.
EXPOSURE	<u>Exposure</u> . Code assigned to exposure (geographic orientation)
POSITION	<u>Physiographic Position</u> . Code assigned to the physiographic characteristics of the terrain
COD_SLOPE	<u>Slope</u> . Code assigned to the slope
ALTITUDE	<u>Altitude</u> . Value of altitude above sea level, expressed in meters.
TRANSFER	<u>Transfer Time</u> . Corresponds to the travel time between one sample unit (plot) and the next. Expressed in minutes, without decimals.
START_TIM	<u>Start time for construction of the sample unit (plot)</u> . Time expressed in HH:MM.
END_TIM	<u>End time for construction of the sample unit (plot)</u> . Time expressed in HH.MM.
T_ROCK	<u>Rock Type</u> . Code assigned to rock types
T_SOIL	<u>Soil Type</u> . Code assigned to each soil type.
TEXTURE	<u>Soil Texture</u> . Code assigned to each soil texture.
SOIL STRUCTURE	<u>Soil Structure</u> . Code assigned to each soil structure.
pH	<u>Soil Acidity (pH)</u> . Soil reaction code.
DEPTH	<u>Soil Depth</u> . Code for soil depth.
DRAINAGE	<u>Soil Drainage</u> . Drainage code.
SERIES	<u>Soil Series</u> . Corresponds to a classification that includes different soil variables grouped to obtain a specific SOIL SERIES or TYPE. Input Soil Series Code.
STAT_DEV	<u>State of Forest Development</u> . Input State of Development Code.
ORIGEN	<u>Forest Origen</u> . Input Origen Code.
STRUCTURE	<u>Forest Structure</u> . Input Structure Code.
COMPOSITION	<u>Forest Composition</u> . Code assigned to stand composition.
COV_UNDER	<u>Understory Coverage</u> . Percentage of understory coverage.
T_UNDER	<u>Type of Understory</u> . Code of Type of Understory.
NAT_MON	<u>Natural Monument</u> . Natural Monument Code.
STRAT_AREA_01	<u>Strategic Areas</u> . Code for Strategic Areas, up to 5 may be entered per plot.
DIST_ROAD	<u>Distance to Roads</u> . Range of distance to roads nearby the area. Input Distance to Roads Code.
TYPE_ROAD	<u>Type of Road</u> . Description of the Road Type (paved). Input Road Type Code.
QUAL_ROAD	<u>Quality of Roads</u> . Description of the road conditions for vehicle travel. Input Road Quality Code.

TREES (green)

The TREES worksheet reflects information on each of the trees in the plot, including DBH, quality, phytosanitary status, etc.

TREES Excel worksheet for external data import into the system

The following variables are included in the TREES worksheet:

KEY	A key that includes inventory, field, stand and plot codes. This is assigned automatically and does not need to be filled in by the user.
PSU_NUM	Primary Sample Unit (Plot). Corresponds to the plot or Primary Sample Unit number. This is the unit in which the sample and sub-sample trees will be measured.
TREE	Tree Sequence Number. Corresponds to a whole sequence number that identifies each tree measured in the plot.
SPECIES	Tree Species. Code assigned to each tree species.
DBH_1	Diameter at Breast Height 1. DBH at 1.3 meters above ground level measured in cm to 1 decimal point. This variable MUST be entered.
DBH_2	Diameter at Breast Height 2. DBH at 1.3 meters above ground level measured in cm to 1 decimal point. Input of this variable is OPTIONAL .
AZIMUTH	Azimuth to tree from center of PSU. The azimuth must be taken from a known point of reference (center of the plot) to each tree, expressed in degrees, to determine its geographic position.
DIST_PR	Distance from tree to center of PSU. The distance must be measured from a known point of reference (center of the plot) to each tree, expressed in meters (m) without decimal points, to determine the geographic positions.
AGENT	Phytosanitary Agents. Agents code.

SYMPTOM	<u>Symptoms and/or Signs on the Tree.</u> Symptoms and signs code.
CANO_TYPE	<u>Tree Canopy Types.</u> Canopy type code.
STRAIGHT	<u>Tree Straightness.</u> Corresponds to an estimate of straightness for each tree. Straightness code.
FORM	<u>Form of the Tree.</u> Corresponds to an estimate of the form of each tree. Input form code.
HEALTH	<u>General Tree Health.</u> Corresponds to an estimate of the health of each tree. Input health code.
DEF_HEIGHT_1	<u>Default Height 1.</u> Default height 1 of the trunk, expressed in meters (m) without decimal points. This variable is optional.
DEF_HEIGHT_2	<u>Default Height 2.</u> Default height 2 of the trunk, expressed in meters (m) without decimal points. This variable is optional.
DEF_LENGTH_1	<u>Default Length 1.</u> Default length 1 expressed in cm without decimal points. This variable is optional and is input only if Default Height 1 has been entered.
DEF_LENGTH_2	<u>Default Length 2.</u> Default length 2 expressed in cm without decimal points. This variable is optional and is input only if Default Height 2 has been entered.
AUX_1	<u>Auxiliary Variable 1.</u> Optional sample variable, input only if defined in the inventory.
AUX_2	<u>Auxiliary Variable 2.</u> Optional sample variable, input only if defined in the inventory.
AUX_3	<u>Auxiliary Variable 3.</u> Optional sample variable, input only if defined in the inventory.
DEAD	<u>Dead Tree.</u> Allows the user to record whether the tree is living or dead. Enter “Y” if the tree is DEAD and “N” if the tree is LIVING.

SUB-SAMPLE (grey)

The SUB-SAMPLE worksheet includes detailed information on trees considered as sub-samples for later adjustment of regression functions used to estimate variables in function of DBH of sample trees. The variables available for this purpose are: total height, commercial height, canopy coverage, increase in DBH, and age.

KEY	NUM	UMP	ARBOL	ESPECIE	DAP3	ALT TOTAL	ALT COM	COPA N	COPA S	COPA E	COPA O	INC	ESP	COM	EDAD
1	555-1-2-3094	3094	1	1155	10.0	12.0	0.0	2	1	2	3	15	0	0	0
2	555-1-2-3094	3094	2	1155	18.0	15.0	0.0	4	2	2	1	18	0	0	0
3	555-1-2-3094	3094	3	1205	21.0	13.0	12.0	3	3	2	1	24	0	0	0
4	555-1-2-3094	3094	4	1158	24.0	15.0	12.0	1	1	1	1	16	0	0	0
5	555-1-2-3094	3094	5	1571	31.0	17.0	15.0	0	2	2	1	33	0	0	0
6	555-1-2-3094	3094	7	1571	32.0	17.0	15.0	0	0	0	0	0	0	0	0
7	555-1-2-3094	3094	8	1642	24.0	8.0	0.0	0	0	0	0	0	0	0	0
8	555-1-2-3094	3094	9	1482	29.0	22.0	0.0	0	0	0	0	0	0	0	0
9	555-1-2-3094	3094	10	1442	29.0	6.0	0.0	0	0	0	0	0	0	0	0
10	555-1-2-3094	3094	11	1442	29.0	6.0	0.0	0	0	0	0	0	0	0	0
11	555-1-2-3094	3094	12	1703	32.0	18.0	0.0	0	0	0	0	0	0	0	0
12	555-1-2-3094	3094	13	1703	34.0	17.0	0.0	0	0	0	0	0	0	0	0
13	555-1-2-3094	3094	14	1442	24.0	7.0	0.0	0	0	0	0	0	0	0	0
14	555-1-2-3094	3094	15	1442	26.0	6.0	0.0	0	0	0	0	0	0	0	0
15	555-1-2-3094	3094	16	1442	20.0	6.0	0.0	0	0	0	0	0	0	0	0
16	555-1-2-3101	3101	2	1250	16.0	15.0	0.0	0	0	0	0	0	0	0	0
17	555-1-2-3101	3101	3	1725	28.0	16.0	0.0	0	0	0	0	0	0	0	0
18	555-1-2-3101	3101	4	1614	19.0	17.0	0.0	0	0	0	0	0	0	0	0
19	555-1-2-3101	3101	5	1250	20.0	17.0	0.0	0	0	0	0	0	0	0	0
20	555-1-2-3101	3101	6	1418	32.0	18.0	0.0	0	0	0	0	0	0	0	0
21	555-1-2-3101	3101	7	1725	30.0	18.0	0.0	0	0	0	0	0	0	0	0
22	555-1-2-3101	3101	8	1725	40.0	19.0	0.0	0	0	0	0	0	0	0	0
23	555-1-2-3101	3101	9	1094	55.0	19.0	0.0	0	0	0	0	0	0	0	0

SUB-SAMPLE Excel worksheet for external import into the system

The following variables are included in the SUB-SAMPLE worksheet:

TREE	Sequence Number of Sub-Sample Tree. Corresponds to a whole number in sequence that identifies each sub-sample tree in the plot.
SPECIES	Tree Species. Code assigned to each tree species of the sub-sample trees.
DBH3	Diameter at Breast Height 3. DBH at 1.3 meters above ground, expressed in cm to 1 decimal point for the sub-sample trees. Input of this variable is OBLIGATORY.
TOT_HEIGHT	Total Height of the Tree. Enter value in meters (m) expressed to 1 decimal point.
COM_HEIGHT	Commercial Height of the Tree. Enter value in meters (m) expressed to 1 decimal point.
CANOPY_N	Canopy Radius to the North. Refers to the radii measured from the trunk to the end of the canopy. Enter value in meters (m) with no decimal points.
CANOPY_S	Canopy Radius to the South. Refers to the radii measured from the trunk to the end of the canopy. Enter value in meters (m) with no decimal points.
CANOPY_E	Canopy Radius to the East. Refers to the radii measured from the trunk to the end of the canopy. Enter value in meters (m) with no decimal points.
CANOPY_W	Canopy Radius to the West. Refers to the radii measured from the trunk to the end of the canopy. Enter value in meters (m) with no decimal points.

GRO	<u>Radial Growth.</u> Corresponds to the RADIAL growth over the last “N” years (PERIOD defined in the inventory). Value must be expressed in millimeters (mm).
BARK_THICK	<u>Bark Thickness.</u> Corresponds to bark thickness at DBH height. Value must be expressed in millimeters (mm).
AGE	<u>Age.</u> Corresponds to the age of the tree, determined from trunk analysis at stump height. Value must be expressed in years with no decimal points.

REGENERATION (purple)

The REGENERATION worksheet is designed to record information associated to regeneration of tree species within one or more sub-plots in the Principal Sample Unit. The tree species and height of each individual are the important variables in this item.

KEY	NUM UMP	NUM UMS	SUP UMS	PLANTA	ESPECIE	ALT PLANTA
555-1-3-3062	3062	1	50	1	1627	34
555-1-3-3062	3062	2	50	2	1385	54
555-7-4-634	634	3	50	3	1529	67
555-7-3-842	842	3	50	4	1048	120
555-7-2-271	271	1	50	5	1523	240
555-16-6-1471	1471	2	50	6	1518	67
555-7-4-631	631	3	50	7	1409	89
555-15-11-2241	2241	2	50	8	1249	45
555-7-2-272	272	1	50	9	1249	15
555-7-2-272	272	1	50	10	1249	87
555-7-2-274	274	2	50	11	1583	0
555-7-2-273	273	3	50	12	1697	0
555-7-2-273	273	2	50	13	1529	0
555-7-2-273	273	2	50	14	1249	0
555-7-2-273	273	1	50	15	1249	0
555-15-12-1911	1911	1	50	16	1248	0
555-7-2-271	271	1	50	17	1248	0
555-15-12-1911	1911	2	50	18	1325	0
555-15-1-2604	2604	1	50	19	1249	0
555-18-2-2553	2553	1	50	20	1190	0
555-18-2-2553	2553	2	50	21	1452	0
555-18-2-2553	2553	2	50	22	1385	0
555-18-2-2553	2553	3	50	23	1547	0

REGENERATION Excel worksheet for external import into the system

The variables included in the REGENERATION worksheet are:

KEY	A key that includes inventory, field, stand and plot codes. This is assigned automatically and does not need to be filled in by the user.
PSU_NUM	Primary Sample Unit (Plot) Number. Corresponds to the plot number or primary sample unit. Secondary sample units or regeneration plots will be established within this unit.
SSU_NUM	Secondary Sample Unit Number (Regeneration Sub-Plot). Corresponds to the regeneration sub-plot number or Secondary Sample Unit. In this unit the characteristics of regeneration plants will be recorded. There may be one or more SSU in each PSU.
SSU_SURF	Surface Area of the Secondary Sample Unit SSU (Regeneration Sub-Plot). A numeric value is expressed in m ² , up to 2 decimal points.
PLANT	Plant Sequence Number. Corresponds to a whole number in sequence that identifies each plant measured in the regeneration sub-plot.
SPECIES	Tree Species. Code assigned to each tree species.
PLANT_HEIGHT	Total Height of Regeneration Plants. Input value in centimeters (cm) with no decimal points.

HERBACEOUS SPECIES (light blue)

The HERBACEOUS SPECIES worksheet collects information on the presence and abundance of herbaceous species in the sub-plots within the Primary Sample Unit.

KEY	NUM_UMP	NUM_UMT	SUP_UMS	CORREL	ESPECIE	HERB	ABUNDANCIA
1	3062	1	1	1	2		4
2	3062	2	1	1	3		5
3	634	1	1	1	1		1
4	842						
5	271						
6	1471						
7	631						
8	2241						
9	272						
10	272						
11	274						
12	273						
13	273						
14	273						
15	273						
16	273						
17	1911						
18	271						

HERBACEOUS SPECIES Excel worksheet for external data input into the system

The following variables are included in the HERBACEOUS SPECIES worksheet:

KEY	A key that includes inventory, field, stand and plot codes. This is assigned automatically and does not need to be filled in by the user.
PSU_NUM	Sample Unit Number (Plot). Corresponds to the plot number or Primary Sample Unit. In this unit the Tertiary Sample Units or herbaceous species identification plots will be established.
TSU_NUM	Tertiary Sample Unit Number (Herbaceous Species Sub-Plot). Corresponds to the number of herbaceous species plots or Tertiary Sample Units. In this unit, the characteristics of plants considered herbaceous species and/or weeds are recorded. There may be one or more TSUs in each PSU.
TSU_SURF	Surface Area of the Tertiary Sample Unit (Herbaceous Species Sub-Plot). Input a numeric value in m2 up to two decimal points.
SEQUENCE	Sequence Number for Herbaceous Species. Corresponds to a whole number in sequence that identifies an herbaceous species in the herbaceous sub-plot.
HERB_SPECIES	Herbaceous Species and Weeds. Input the Herbaceous Species and/or Weeds code.
ABUNDANCE	Abundance of each Herbaceous Species. Corresponds to the number of individuals identified for each herbaceous species in the sub-plot. Input whole number values.

DEAD WOOD (orange)

The Dead Wood worksheet collects information from line transects established in the Primary Sample Unit to determine the volume of Dead Wood. The relevant variables in this topic are the diameter of fallen sections that intersect with the line transect and a classification by state of decomposition of these sections.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	KEY	NUM_UMP	NUM_LT	LONG_LT	CORREL	COD_CAT	DIAM_TROZO										
173	555-1-3-3062	3062	1	20	1	2	4										
174	555-1-3-3062	3062	1	20	2	3	12										
175	555-1-3-3062	3062	1	20	3	1	8										
176	555-1-3-3062	3062	1	20	4	1	14										
177	555-1-3-3062	3062	1	20	5	1	5										
178	555-1-3-3062	3062	1	20	6	2	5										
179																	
180																	
181																	
182																	
183																	
184																	
185																	
186																	
187																	
188																	
189																	
190																	
191																	
192																	
193																	
194																	
195																	

DEAD WOOD Excel worksheet for external data import into the system

The following variables are included in the DEAD WOOD worksheet:

KEY	A key that includes inventory, field, stand and plot codes. This is assigned automatically and does not need to be filled in by the user.
PSU_NUM	Sample Unit Number (Plot). Corresponds to the plot number or Primary Sample Unit. In this unit the line transect(s) will be established to quantify the volume of dead wood.
LT_NUM	Line Transect Number (Dead Wood Sub-Plot). Corresponds to the dead wood sub-plot number or line transect. This line identifies and measures the dimensions of fallen segments considered to be dead wood. There may be one or more LT in each PSU.
LT_LENGTH	Length of the Line Transect. The length of the line transect is recorded in meters (m) with no decimal points. For example: 20 m.
SEQUENCE	Sequential Numbers of Fallen Sections. Corresponds to a whole number in sequence that identifies each measured fallen section in the dead wood sub-plot.
DECOMP_COD	Decomposition Category of Dead Wood. Corresponds to a classification of the state of decomposition of each fallen section measured. The system considers three states of decomposition: solid, intermediate, and decomposed. Input of this variable is OBLIGATORY.
SECT_DIAMETER	Diameter of the Fallen Section. Corresponds to the diameter of each fallen section that intersects with the line transect. The value is expressed in cm up to one decimal point. Input of this variable is OBLIGATORY.

The LITTER spreadsheet has been designed to record depth measurements for litter at different Measurement Sites. Depth is registered in centimeters and wherever possible samples to determine material Density are taken to then obtain the biomass and Carbon content in the area.

F12																
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	KEY	NUM_LIMP	NUM_PM	PROF_MED_1	PROF_MED_2	PROF_MED_3	PROF_MED_4	DENS_HOJA								
2	555-1-3-3062	3062	1	3	4	6	100									
3	555-1-3-3062	3062	2	4	2											
4	555-1-3-3062	3062	3	8	6											
5	555-1-3-3062	3062	4	10												
6																
7																
8																
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RODALES

PARCHAS

ARBOLES

SUBMUESTRA

REGISTRO

HERBACEAS

MADERAS MUELTAS

HOJARASCAS

Hoja1

Hoja2

View of the LITTER spreadsheet in an Excel Data Entry Template

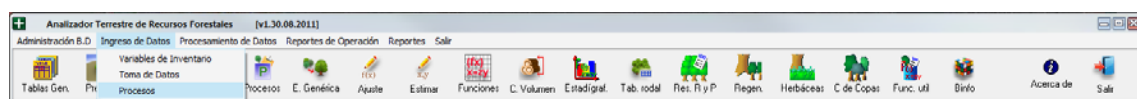
The following details are included in the LITTER spreadsheet:

KEY	This is a key that is used comprising the codes for inventory, field, stand and PLOT. It is automatic. It does not have to be filled out.
NUM_PSU	Unit Measurement Plot Number. Corresponds to the Plot number or the Primary Sample Unit number. This Unit establishes depth measurement sites for litter to estimate the biomass for this component.
NUM_PM	Point of Measurement Number for litter PM (Litter Depth). Corresponds to the number of the Litter Depth Measurement Site. These sites are where litter depth has been registered to determine volume, biomass and carbon. There may be up to 4 Measurement Sites with 4 measurements at each PSU.
DEP_MEAS_1	Measurement Depth 1. At each measurement Site 1 to 4 Depth levels are measured. The value is recorded in centimeters (cm) with no decimals.
DEP_MEAS_2	Measurement Depth 2. At each measurement Site 1 to 4 Depth levels are measured. The value is recorded in centimeters (cm) with no decimals.
DEP_MEAS_3	Measurement Depth 3. At each measurement Site 1 to 4 Depth levels are measured. The value is recorded in centimeters (cm) with no decimals.
DEP_MEAS_4	Measurement Depth 4. At each measurement Site 1 to 4 Depth levels are measured. The value is recorded in centimeters (cm) with no decimals.
DENS_LIT	Litter Density. The specific litter value is entered in the Sample Unit in kg/m ³ . This field is OPTIONAL.

LITTER (coffee)

Summary of input method for +BOSQUE Excel data entry template form			
Sequence	Location	What to do?	What information?
Step 1	Stand Sheet	Enter inventory information, Field and Stand to incorporate it into the system.	Inventory (Inventory Code – Description); Field (Field Code – Description); Date; Stand; Stand Surface; Sample Design; Type of Sample Unit; Measurement; Period; Country
Step 2	Plot Sheet	Enter general information common to the entire Sample Unit.	Sample Unit Surface (m ²); UTM Coordinates; UTM (X & Y); Crew Leader (RUT); Aerial Photographs; Line of Flight; Photo Number; Date of Measurement; Time of Execution; Time of Transfer; Starting Time; Ending Time; Physiographic Characteristics; Vegetation Characteristics; Other Characteristics.
Step 3	Tree Sheet	Incorporate Dendrometric information on Sample Trees included in the Principal Sample Unit (PSU).	Tree (Auto-numbering); Species (Table); DBH 1 (mm); DBH 2 (mm); Agents (Table); Signs or Symptoms (Table); Canopy Type (Table); Dead (Y/N); Azimuth (°); Distance (m); Straightness (Table); Form (Table); Health (Table); Length Default 1 (dm); Height Default 1 (dm); Length Default 2 (dm); Height Default 2 (dm)
Step 4	Subsample Sheet	Incorporate detailed information on subsample trees to do regression adjustments	Tree (Auto-numbering or associated to Sample); DBH 3 (mm) (entered directly or from Sample); Species (Table) (entered directly or from Sample); Total height (dm); Commercial height (dm); Canopy coverage: North Radius (dm); South Radius (dm); East Radius (dm); West Radius (dm); Growth in radius (mm) (during the Period (years) defined for the Inventory); Bark thickness (mm); Age (years)
Step 5	Regeneration Sheet	Add background related to Secondary Sample Units (SSU), in order to describe and quantify information regarding existing regeneration in measurement area.	Number of the Secondary Sample Unit (Numeric); Secondary Sample Unit Surface area (m ²); Individual number sequence (Auto-numbering); Tree Species (Table); Height of plant (cm)
Step 6	Herb Sheet	Enter background on Tertiary Sample Units (TSU) that make it possible to describe the presence of herbaceous plants in the inventory area	Tertiary Sample Unit (Numeric); Tertiary Sample Unit Surface area (m ²); Number Sequence of Herbs or Weeds (Auto-numbering); Abundance (number of individuals of the same species)
Step 7	Dead wood Sheet	Add information regarding Line Transects (LT) in order to describe and quantify the presence of dead wood in the inventory area.	Number of Line Transect (Numeric); Length of the Line Transect (m); number of piece (Auto-numbering); Decomposition Category (Table); Diameter of piece (cm)
Step 8	Litter Sheet	Incorporate Litter depth to quantify information on existing number of leaves in the sample area.	Depth of the layer of litter is taken with a maximum of 4 measurement sites for a maximum of 4 measurements per site in order to define the volume of litter in the PSU established area.

6.5 Processes



Finally, within the module for Data Entry, there is an option for Processes, which is dedicated to gathering the PSU that the user determines in order to do the analysis available in the system. Thus, the PROCESS may comprise one or more Inventories, Fields or Stands, and obviously PSU. In this regard, and according to the user's purposes, it will be feasible within the definition of a Process, to process them as a group or individually, as desired.

Process is a concept used in the system to select data from the database on one or more Inventories, Measurements, Fields, Stands and Plots.

The objective of this option is to allow the user to generate a selection of information, given that based on this definition it will be possible to carry out all the analysis that the system allows, for instance adjustments, estimates, volume calculation, stand tables, etc.

It is vitally important to assimilate clearly the concept of Process, as it is based on this selection of PSU that all the later calculations are made, and the possibilities to obtain processed information are defined.

Procedure to generate a Process

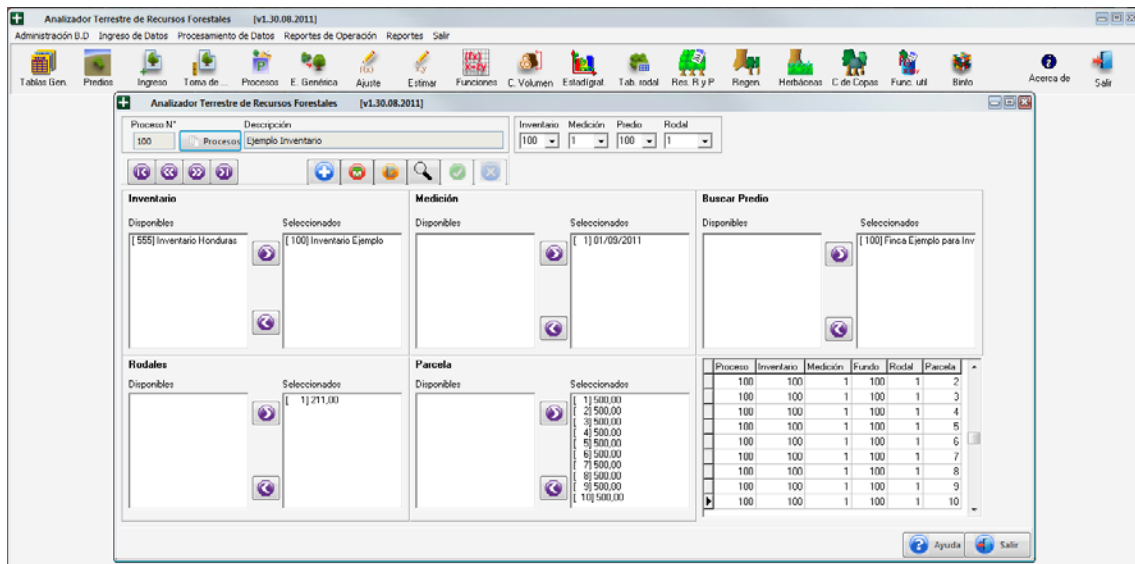
The Process window shows five tabs along the top: Processes, Inventory, Measurement, Field, and Stand. Each of these windows has a specific function, enabling the user to select information in descending order from the inventory level to the stand level.

In order to generate a Process:

Click the Process tab. Next, click the Add button. The system will request the Process Code and a description. Once this information has been added, click the accept button. If the Process already exists, the system displays the error message.

When a new Process is defined, the System makes the entire set of recorded inventories available so that the user can select the inventory(ies) required. To do so, just go from the Inventory Available window to the Chosen Inventory window using the selection arrows.

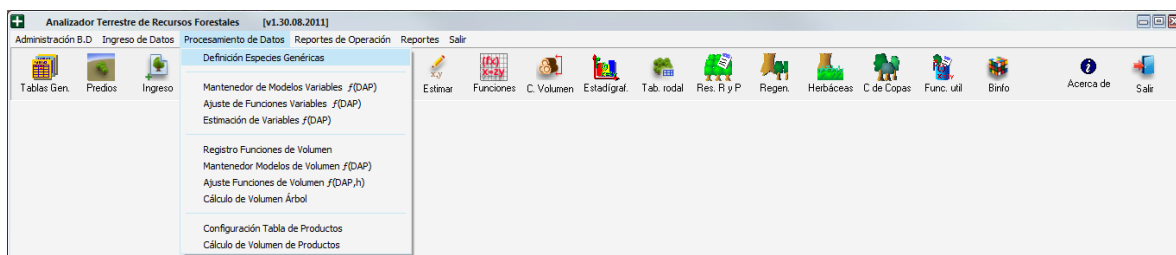
The system default includes all the Measurements, Fields, Stands and Plots that correspond to the Inventories the user has chosen. Therefore, if the user wishes to eliminate any of these elements, just drag them (using the pointer) from the Chosen window to the Available window.



Process Configuring Screen

On the bottom right corner of the screen, there is a summary table with the elements that have been chosen for the corresponding Process.

7. DATA PROCESSING



The Data Processing Main Menu presents several options to process data that was entered in the previous modules and to generate the results in the different areas of the inventory of forest resources.

For the uses of this manual, the following is an explanation of a basic processing sequence to generate results, whereas the rest of the options in this menu are explained further on in the chapter.

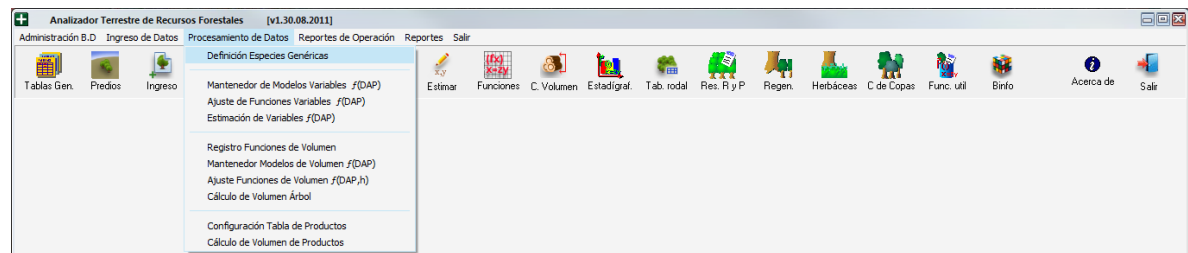
The most basic processing sequence to obtain results from the Land Analysis System for Forest Resources is as follows:

1. Definition of Generic Species
2. Adjusting Functions
3. Generate Volume Functions
4. Calculate Estimated Variables
5. Calculate Tree Volume

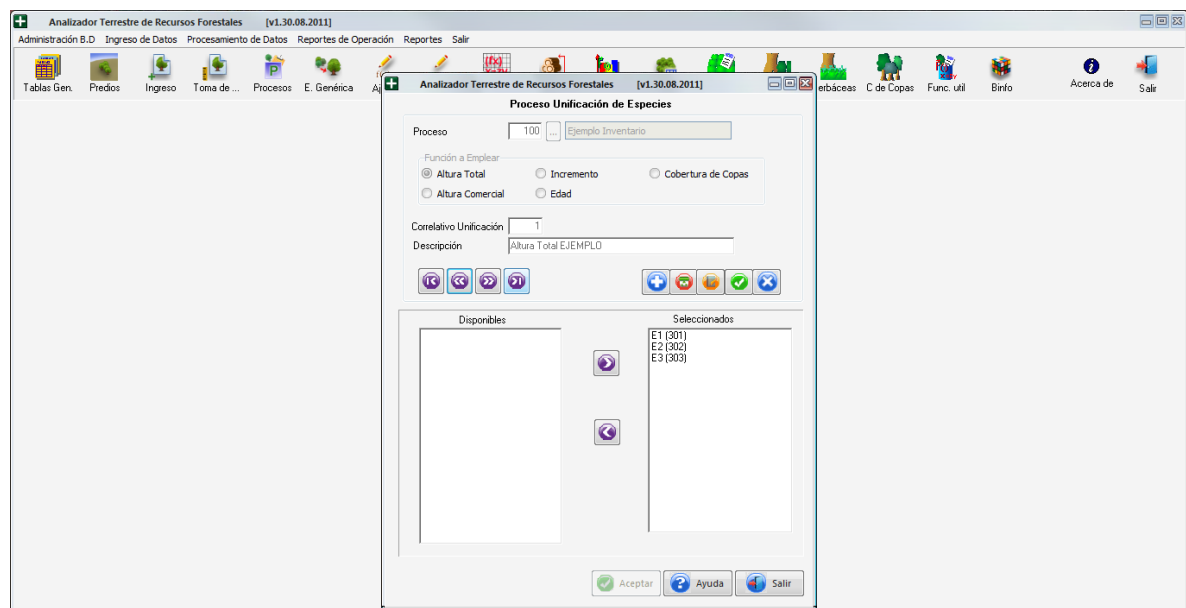
As these options are completed, it becomes possible to access the most basic information processed in the forest inventory. For instance, Stand and Existence Tables can be generated and obtain the inventory statistics.

The following is a description of these basic operations in order for the user to be able to begin interacting with the system.

7.1 Generic Species



The term Generic Species refers to the clustering of tree species that belong to a single Process and that due to some criteria have been placed together in this way in order to be able to have enough subsamples to adjust the models for Total Height, Commercial Height, Shade Coverage, Growth, and Age. The Generic Species are specified per included Variable, that is, it is necessary to define Generic Species for Total Height, Commercial Height, Shade Coverage, Growth and Age on an individual basis. This way, different Generic Species can be defined for each variable, which makes carrying out the task of adjusting the functions much more flexible.



Screen for Tree Species Unification.

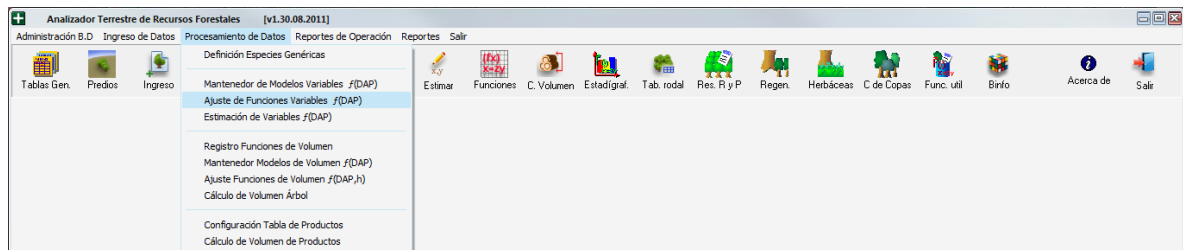
Procedure to Generate Unified Species

- Click the Add button.
- Enter the Process code. If unknown, click the select button and choose the desired Process from the list and Accept.
- Select the Variable of interest from among the five available alternatives in the top of the selector (Total Height, Commercial Height, Growth, Age or Shade Coverage). The choice is made by clicking inside the white circle next to each Variable.
- Enter the number in the Number Sequence Unification field
- Enter the coded description for Generic Species in order that it can be easily identified. It is recommended to use the common names of the real species.
- There are two boxes in the window. In the first one (Available) the system presents a list of the tree species that are part of the Process and that are available for the user to choose from. The second box (Chosen) indicates the tree species that have been selected for this unification.
- As for the Available window, choose the species that you want to include in this unification. Carry out this selection by checking off the species. After the selection has been made, click the Accept button.
- Repeat the previous procedure for all available species, and for all variables that are to be used.

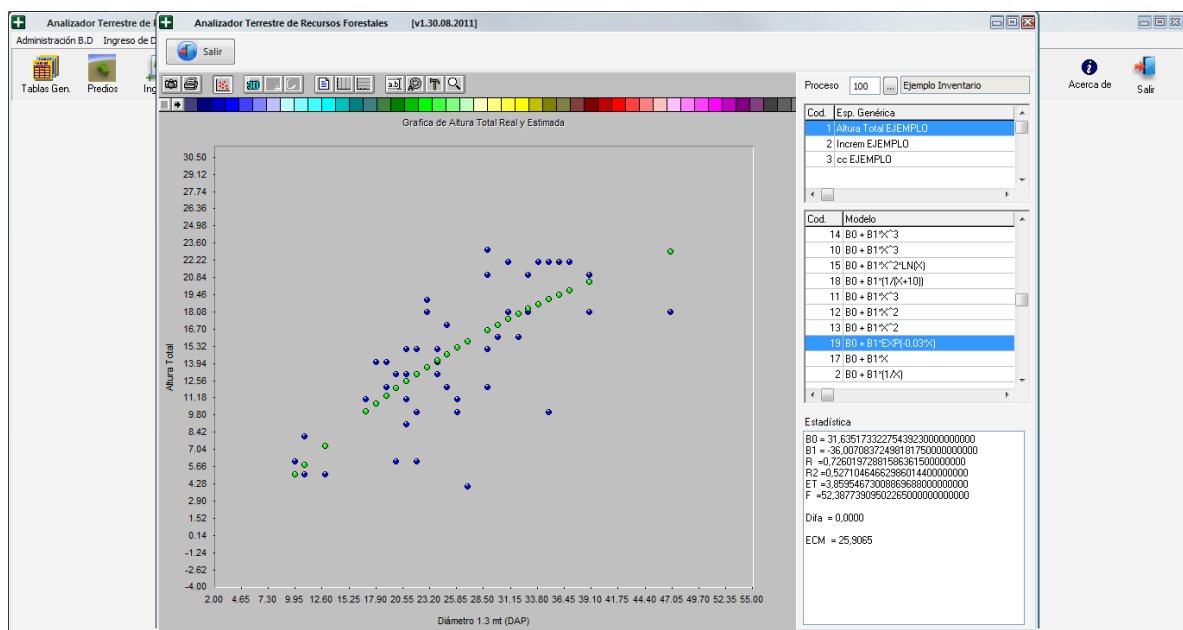
IMPORTANT

All the available species must be associated with a generic species even if it is the original species. For instance: Oak Oak.

7.2 Adjustments



The Adjustments option enables the user to view the background information of original subsample data, as well as estimated data from each of the Models in the database. It is also possible to verify the regression coefficients estimated for each Model, and statistical indicators associated with these Models.





Adjustment screen for regression functions for tree species variables.

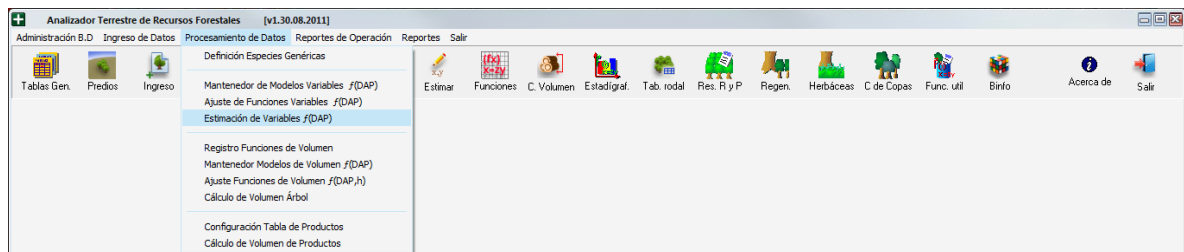
IMPORTANT

The method implemented in making adjustments of all kinds of functions requires the subsample to have “a minimum of 9 data;” otherwise, the Generic Species is not available to make the adjustments. This is done in order to insure that the sample size is large enough to adjust functions with a degree of certainty in the statistical procedure used.

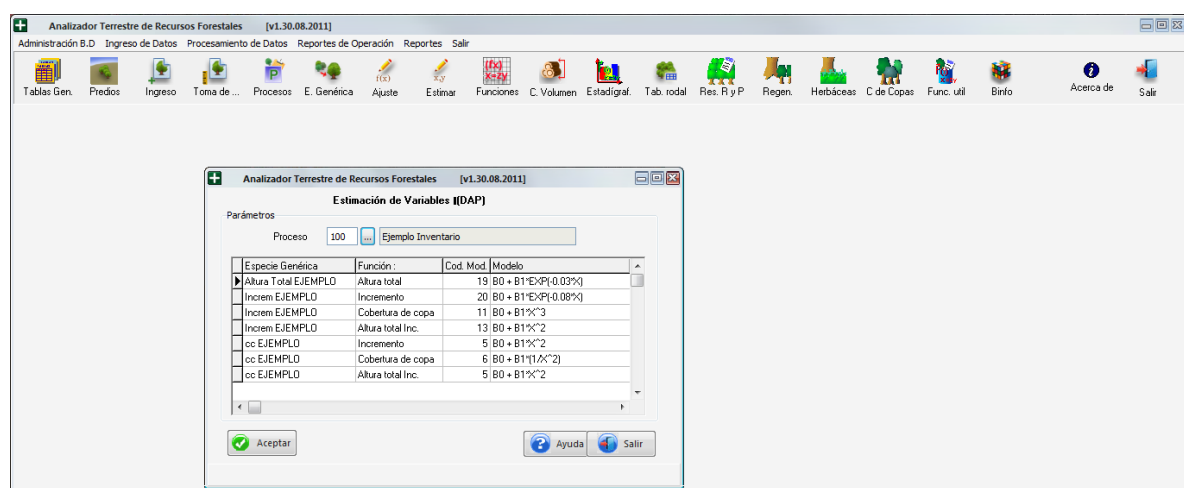
Procedure to Incorporate Regression Models

- When the Adjustment option is selected, what appears on screen is the graphic area with windows for Generic Species, Models and Adjustment Results.
- Enter the Process code. If it is not known, press the selection button  and select the Process.
- Once the Process has been selected, it is possible to move the cursor to the Generic Species and Models windows to view the adjustment figure. It is also possible to view the numeric results of the adjustments in the lower right window of the screen, when moving through the upper windows.
- Once the Analysis is done, press the  button to leave the option.

7.3 Calculate the Estimated Variables




This process makes it possible to generate the coefficients in all of the Models that exist in the database of Regression Models for every user-created Generic Species.



Screen to select regression functions for different Generic Species.

Procedure to generate Coefficients


- Enter the Process code or select from the  list.
- Press the Accept button. 

This procedure calculates the estimated variables based on the regression function selected for each dependent variable and Generic Species, the system default presents the regression function with the least Root Mean Squares Error, regardless of whether the user has selected a different function to apply.

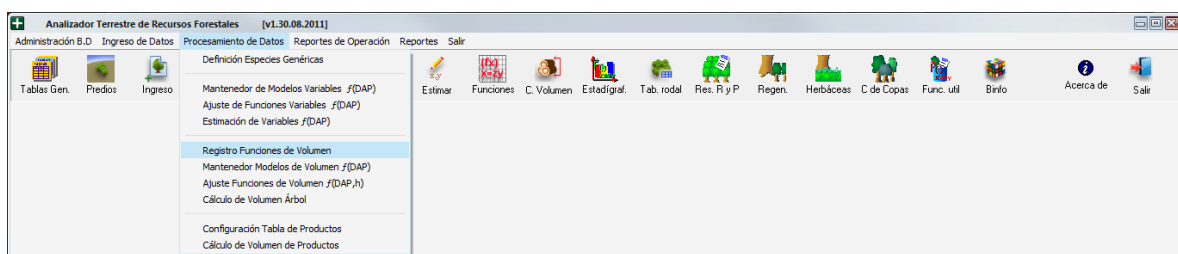
IMPORTANT

This process uses the Generic Species for calculation; therefore, it is required that these be defined by the user in order to estimate the available variables.

Procedure to calculate Estimated Variables

- Enter the Process code or select it from  the list.
- Select a regression function to apply from the box that appears when you click the cell in the Model column.
- Repeat this procedure for each Generic Species.
- Click the Accept button.

7.4 Generating Volume Functions



This option makes it possible to create volume functions to be applied in a process. These functions are defined for every species; therefore, data such as: Area, Diameter Limit, Sample Size, Diameter Range, Height Range are only references.

The functions window displays the defined volume functions along the top; to the right of this window is the vertical slider that makes it possible to move through the records, the button to refresh the information is at the bottom of the screen. At the bottom part of the window there is the horizontal slider, which makes it possible to view the rest of the columns located to the right.

Under the grid there is a toolbar, which makes it possible to add new functions, edit existing functions that need to be modified, or to eliminate functions, accept records and cancel changes made. There are also buttons to advance to the first record, the last record, and advance or go back one record at a time.

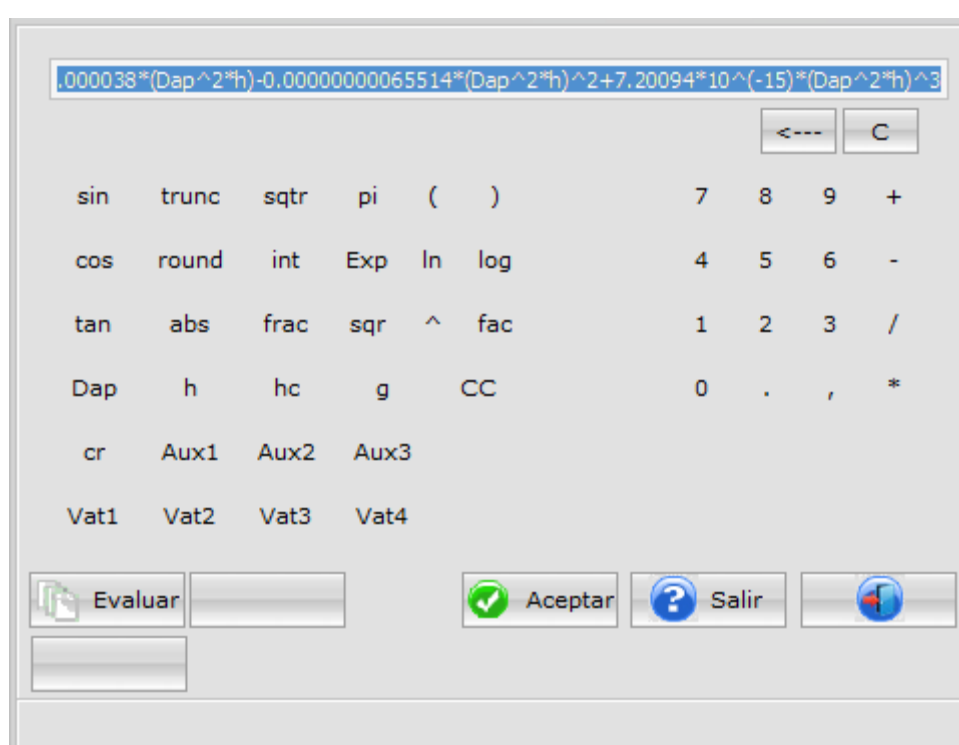
Screen for recording volume functions to calculate the volume of different Tree Species.

The screenshot displays the 'Analizador Terrestre de Recursos Forestales' software interface. The window title is 'Analizador Terrestre de Recursos Forestales [v1.30.08.2011]'. The interface includes a menu bar with options like 'Administración B.D.', 'Ingreso de Datos', 'Procesamiento de Datos', 'Reportes de Operación', and 'Reportes'. Below the menu is a toolbar with icons for 'Tablas Gen.', 'Predios', 'Ingreso', 'Toma de ...', 'Procesos', and 'E. Gen.'. The main area is divided into two panes. The left pane shows a list of functions, with one function highlighted: $0.0000083273(Dap^2h)+0.00054(Dap^2)$. The right pane shows a form for recording function details. The form includes fields for 'Código' (4), 'País' (216), 'Chile', 'Diámetro Límite' (0.3389), 'Tamaño Muestral' (195), 'ESE' (0.3389), 'ECM' (22), 'Rango Diamétrico' (0.463257 to 88.1999), 'Rango de Altura' (empty), 'Unidad del Dap' (Centímetros), 'Unidad de la Altura' (Metros), 'Unidad del Volumen' (Metros Cúbicos), 'Fuente' (Manejo Sustentable Del Bosque Nativo), and 'Observaciones' (Función obtenida para el volumen total para la especie COIHUE DE CHILE). At the bottom of the form is a 'Función' field containing the same function as the list: $0.0000083273(Dap^2h)+0.00054(Dap^2)$. There are also buttons for 'Especie', 'Ayuda', and 'Salir'.

Procedure to register Function of Volume

- Click the button to enter a Record.
- Enter the code for the function, this code is a sequential number assigned by the user to identify the function.
- Enter the Zone code, or select () from the list.
- Enter Diameter Limit. This variable is optional and it is used to assign a characteristic to the function.
- Enter Sample Size. This variable is optional and it is used to assign a characteristic to the function.
- Enter ESE. This variable is optional and it is used to assign a characteristic to the function.
- Enter MQE. This variable is optional and it is used to assign a characteristic to the function.
- Enter Diameter Range and Diameter Height. These variables are optional and they are used to assign a characteristic to the function.
- Enter DBH. This variable is optional and it is used to register a comment about this variable.

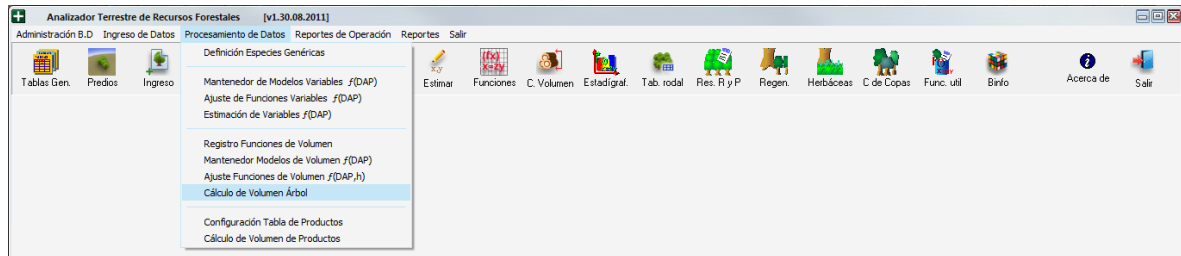
- Enter Height. This variable is optional and it is used to register a comment about this variable.
- Enter Volume. This variable is optional and it is used to register a comment about this variable.
- Enter Source. This variable is optional and it is used to register the source of the information.
- Enter Observations. This variable is optional and it is used to register any comment regarding this option.
- The volume function formula must be created by the user using the tools the system provides. Following is the description of the procedure that makes it possible to generate the formula.
- Click the Function button, which is on the lower right corner of the window. This button provides a calculator that has been specially made to generate volume functions.



Calculator used to incorporate new Volume Functions into the system.

This Calculator makes it possible to incorporate new volume functions into the system. This is done through arithmetic operations, the number keyboard, and the most common variable options (DBH, h, Hc, etc.). There are also Auxiliary Variables, and Table Auxiliary Variables that can be defined by the user.

7.5 Calculating the Volume per Tree



This option makes it possible to apply Process samples to the trees. These are previously defined volume functions used to determine the volume for each individual in the sample and subsequently add it to the Sample Unit level and the higher Surface Unit (hectare).

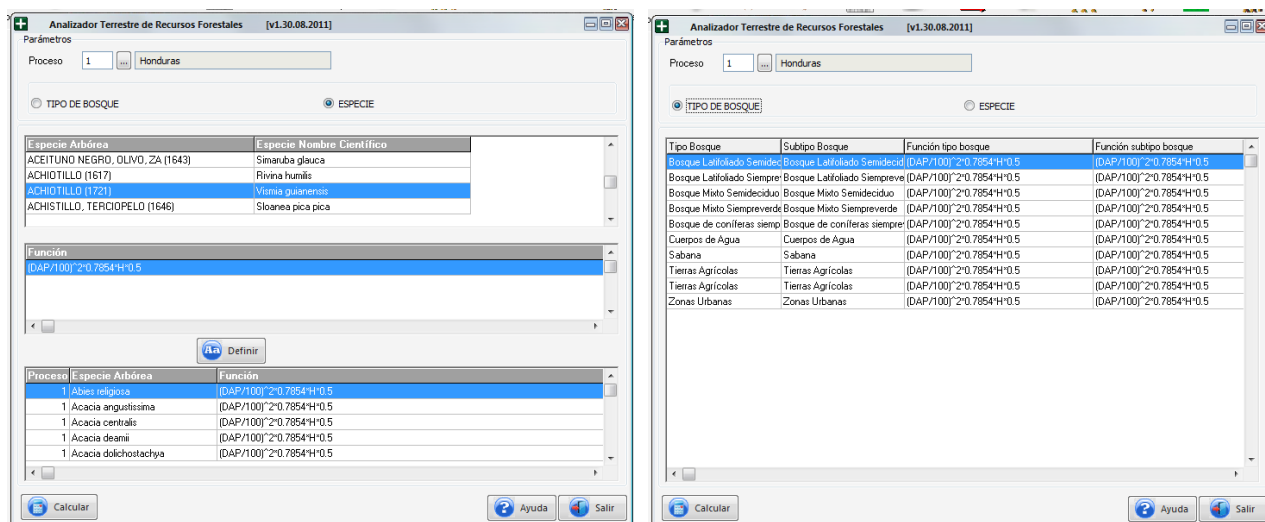
The two parallel alternatives to calculate the volume per tree are as follows:

- The first is at the species level: For this option the system uses a volume function that is assigned to each specific species, which applies to individuals of that species.
- The second is at the level of forest Type/Subtype: In this case, the system recognizes the forest type assigned to each Plot and using the volume functions defined for the corresponding Types/Subtypes of Forest (which also are divided into conifers and broadleaved) determines the volume for each individual in the sample unit.

This differentiation in the methods used to calculate the volume for each tree is because it is difficult to have volume functions for the entire range of species that occur in an inventory, particularly in tropical areas where, species abundance renders impractical the construction of functions for each.

In any case, the volume functions per species make it possible to process the volume on these species achieving finer estimates.

The windows associated with calculating the volume per tree provide the default volume functions for each species or each forest type. However, the user has the option to define volume functions to be used on each species or forest type. This can be achieved by changing the default functions for those that are most appropriate in each case.



Screens associated with Volume Functions for Tree Species and Forest Types in a Process

Procedure to Calculate the Tree Volume

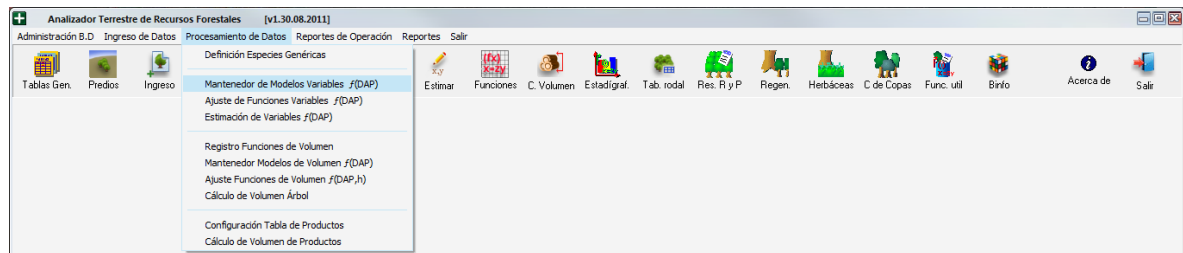
- The options to process by SPECIES or FOREST TYPE are at the top of the screen. The user can then select the option as needed.
- If the option to Process by SPECIES is selected, the screen presents three windows. The first shows the species belonging to the selected process. The second shows the volume functions that are available, and independent from the process. The third window shows the functions selected per species to be applied to the samples.
- Enter or select the Process code. Then press the Tab Key for the system to display the Process species and available functions in the window.
- When you click the tree species in the first sub-window with the Mouse, the system displays the available volume functions for the selected species in the Function window.
- To select the function that is to be applied to each species, first use the Mouse to select the DEFINE function, and then click the ACCEPT button.
- Repeat this action for each species in the Process.
- Once the functions have been defined, click the CALCULATE button to calculate the volumes.
- Once the process is finished, the window will disappear, and you will be able to continue with the procedures you require.
- If the processing option for FOREST TYPE is selected, a screen appears with the Forest Types and Subtypes that pertain to the selected process, and their respective volume functions.
- The system first analyzes whether there are functions in the Forest Subtype. If no function has been defined, it will use the one from the Forest Type to do the respective calculations.
- Changes in the default functions can be made in the Forest Types or Sub-types Table, where it is possible to assign the volume functions that are needed for each forest type or subtype.

- Once the functions have been revised by Forest Type/Sub-type, click the CALCULATE button to calculate the volumes.
- Once the procedure has terminated, the window will vanish and you will be able to continue with the processes you require.

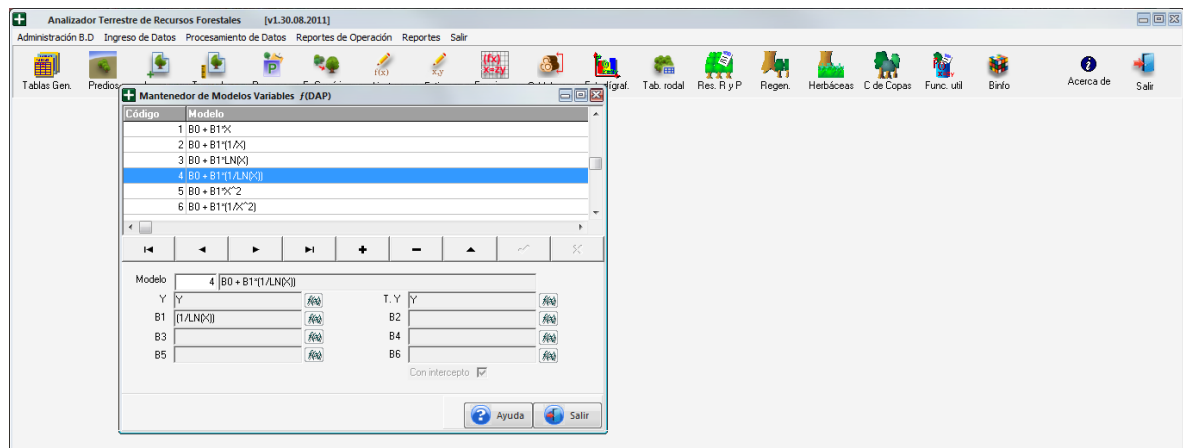
Summary of basic processing sequences for +BOSQUE			
Sequence	Location	What to do?	What information?
Step 1	Enter Data – Processes	Select information on one or more inventories from the database: Measurements, Fields, Stands, and Plots. Based on these settings you can do all the analysis the system allows.	Process code and description. Then, select Inventory(ies); Measurement(s); Field(s); Stand(s); Plot(s)
Step 2	Data Processing -Define Generic Species	Generic Species is the name given to the groupings of tree species that pertain to a Process and that under some criteria are grouped such that there are enough sub-samples to adjust the models for Total Height, Total Commercial, Canopy Coverage, Increment and Age.	Process Code – Select Variable – Select Tree Species for each case
Step 3	Data Processing -Adjust Functions: f(BHP) Variables	Enables graphic presentation of background information from original data and from sub-sample, as well as the data estimated in each of the Models present in the database. It is also possible to verify the regression coefficients estimated for each Model and some statistical indicators associated with the Models.	Process Code – Select Generic Species and Variable to be adjusted
Step 4	Data Processing -Estimate f(BHP) Variables	This procedure calculates estimated variables based on the regression function selected for each dependent variable and Generic Species. System default presents the regression function with the least Root Mean Squares Error, with no prejudice if the user selects a different function for application.	Process Code – Modify system default Functions
Step 5	Data Processing - Calculating Tree Volume	This option makes it possible to apply previously defined volume functions on the tree samples in a Process. This is the window where the user must define the volume functions to be used for each species.	Process Code – Assign Volume Functions for each tree species

7.6 Other Data Processing Options

Variable Model Manager $f(DBH)$




The Model Manager makes it possible to incorporate multiple regression models with up to six coefficients plus the intercept to a model database, which can in turn be used to make adjustments on the sub-samples of the variables.



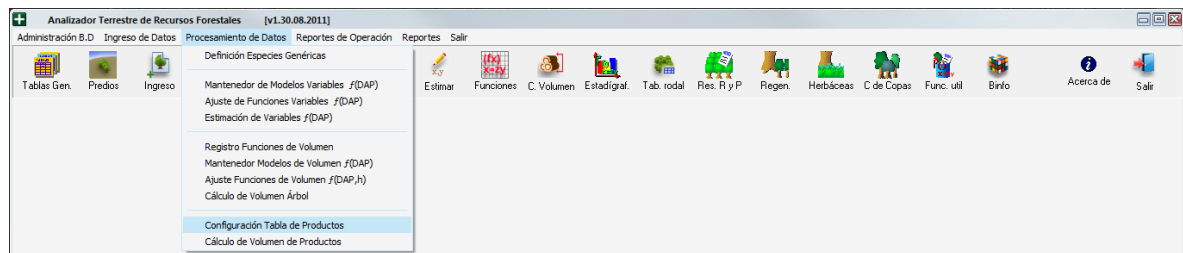
Screen for the Regression Model Manager

Procedure to Incorporate Regression Models

- Click the add button 
- Enter the Model. This is the whole number you have assigned to the new Model.
- Select the key next to the regression model dependent variable (Y). Selecting this button will display a “calculator” that allows you to define the form of the Dependent Variable that is considered in the Model.
- With the mouse, define the adequate mathematical function for the Model Dependent Variable (this can be any operation associated to “Y,” for instance: Y, Square Root of Y, Exp Y, etc.)

- Click the accept button after completing the previous steps. Once the variable has been accepted, the Model Manager Template will be activated again.
- Depending on the Model that is being incorporated, do the same operation (as in "Y") for each of the Model's Independent Variables (B1, B2, B3, B4, B5, B6). That is, click the button and define the form for each variable using the "calculator," and clicking Accept when each coefficient has been defined. If the Model has fewer than six coefficients available, complete the definition of coefficients until necessary to describe the Model.
- In case the dependent Variable ("Y") is not directly "Y," in other words, if there is some mathematical transformation associated with it, click the button that is next to the abbreviation T.Y. (This means Transformation of Y) and define the operation that is the inverse of "Y" so that when the functions are calculated, the system can obtain the value for "Y" directly, and not the transformation of this variable. The definition of the "Y" inverse operation, or Transformation of Y (T.Y.) is similar to defining Y itself, or the coefficients that is, using the "calculator." The following is an illustration of one way of doing this procedure: If you define $\text{SQRT}(Y)$ (Square Root of Y) as the Dependent Value, the Transformation of Y (T.Y.) has to be Y^2 (Y Squared).
- Having defined the Model's Dependent and Independent Variables, it becomes necessary to define whether the Model being incorporated passes through the origin or not. To do so the Manager has a box that indicates "with intercept" which has to be selected if the Model does not pass through the origin, and you must deselect it when the Model passes through the origin.
- Finally, click the accept button to incorporate the Model to the system database.

Product Configuration Management



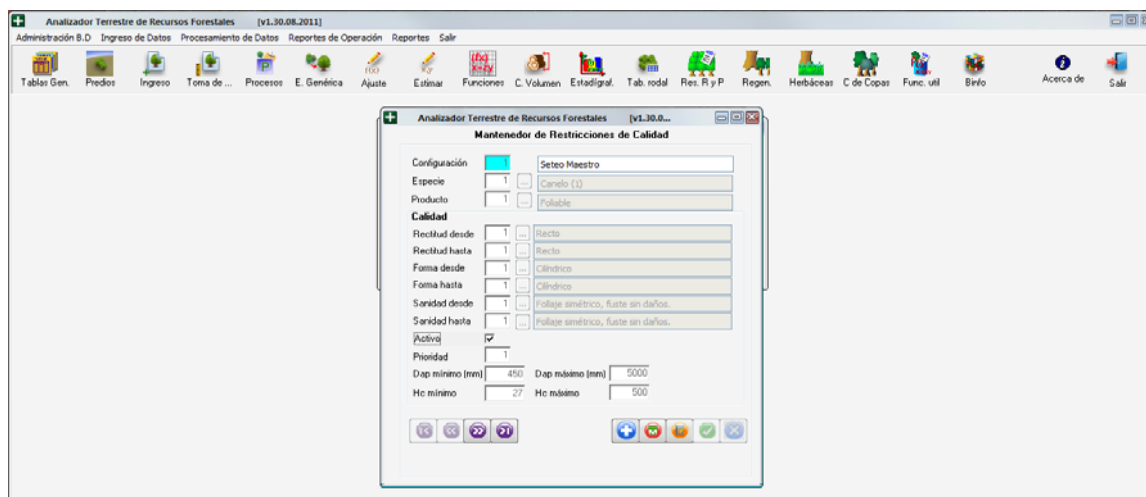
The purpose of managing product configuration is to define the products to be obtained from a tree of a determined species. The following is the procedure.



Screen for Configuring Products

Procedure to Generate Products

- The first step is to create the Master Configuration, which will be used to define the rest of the settings. This Configuration shows the products and their restrictions and the weighting for each product, all defined at the species level.
- Click the Add button, then enter the Configuration & Description Code and accept.
- Click the button to define the products and their restrictions.
- Click the button to enter the product weighting for each species.
- Definition Attributes for Quality Restrictions Screen.
- When you click the button, the next window appears.



Screen for Product Quality Restriction Management.

List of attributes for quality restriction

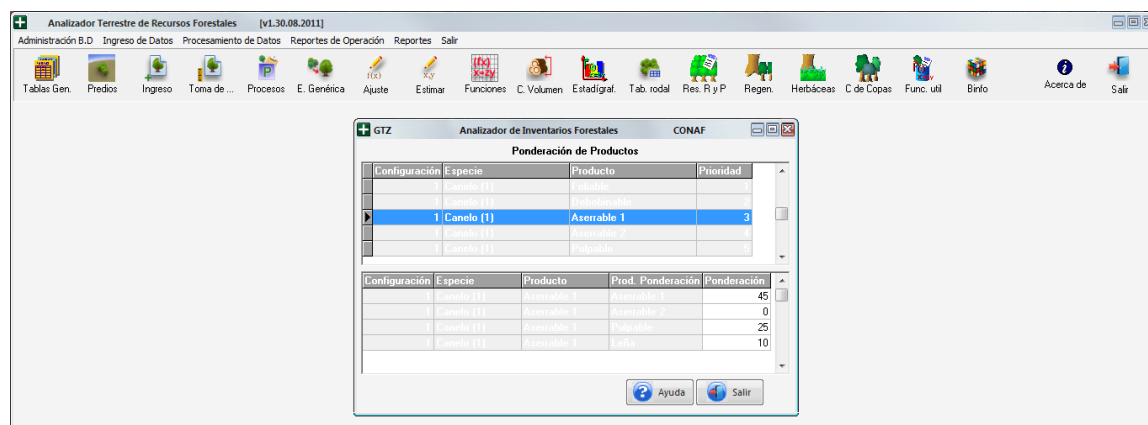
NAME	CHARACTERS	DEFINITION
Configuration		Configuration Code
Species		Refers to Tree Species
Product		Refers to products
Straightness from		Refers to Table for Straightness
Straightness to		Refers to Table for Straightness
Form from		Refers to Table for Forms
Form to		Refers to Table for Forms
Health Increase from		Refers to Table for Health Increase
Health Increase to		Refers to Table for Health Increase
Active	Logic (1)	Value = True / False
Priority	Numeric (2)	Use to assign priorities within the tree volume
DAP minimum (mm)	Numeric (6)	Enter value of BHP range
DAP maximum (mm)	Numeric (6)	Enter value of BHP range
Minimum Commercial Height	Numeric	Enter value for Commercial Height range
Maximum Commercial Height	Numeric	Enter value for Commercial Height range

Procedure to Generate Quality Restrictions

- Click the Add option in this window select the Add option.
- Enter the required data and click the Accept button once the information is recorded, or click the button if you do not wish to add data.
- Repeat this operation for each product and species to be added.

Defining Attributes in the Product Weight Screen

Pressing the WEIGHTING button will display the following window.

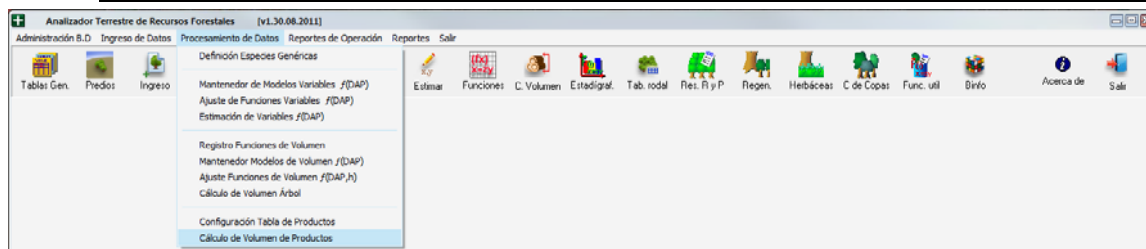


Screen for Volume Weighting for each Product

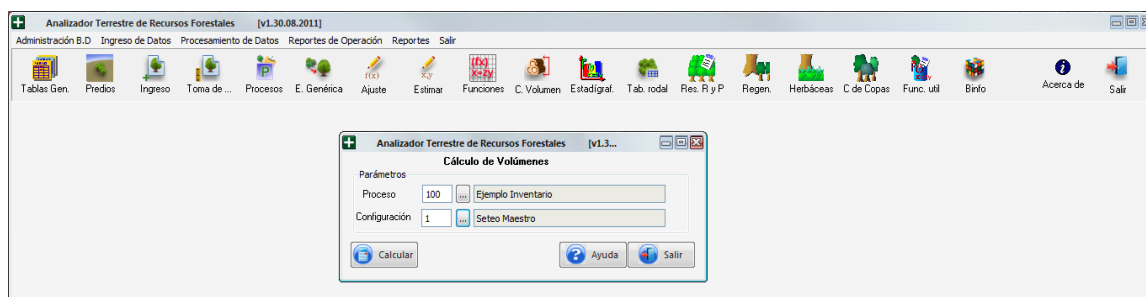
Product Weighting Procedure

- This is the window to enter the weight for each species and product.
- The weighting corresponds to the percentage of the total volume for each tree of the species that is to be distributed into the different products, according to previously generated restrictions.
- In order to enter the weight of a product per given species, select the species from the list on the first grid in the window. Clicking on the chosen row, the lower grid displays the corresponding weight products.
- In the weighting column, enter the percentage to be considered until completing 100% maximum.
- Once the corresponding percentages have been assigned, click the button. The system will then store the data for future use.

Calculation of Product Volume



This option calculates the volumes of the products based on the chosen Process and Configurations.



Screen with Parameters to calculate the volume per product

Procedure to calculate Volumes per Product

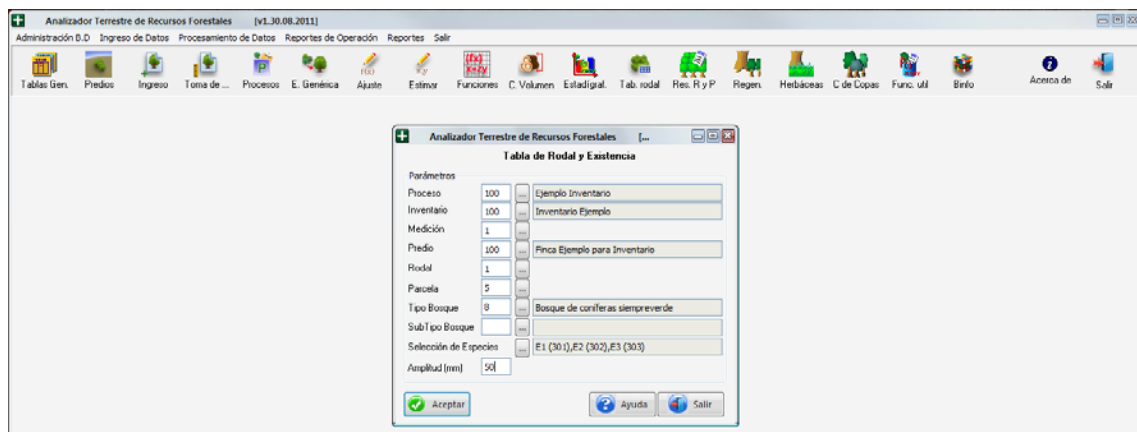
- Enter the process code or chose it from the list.
- Enter the configuration code or select one from the list, and click the
- Once the data has been processed, click the button.



8. REPORTS

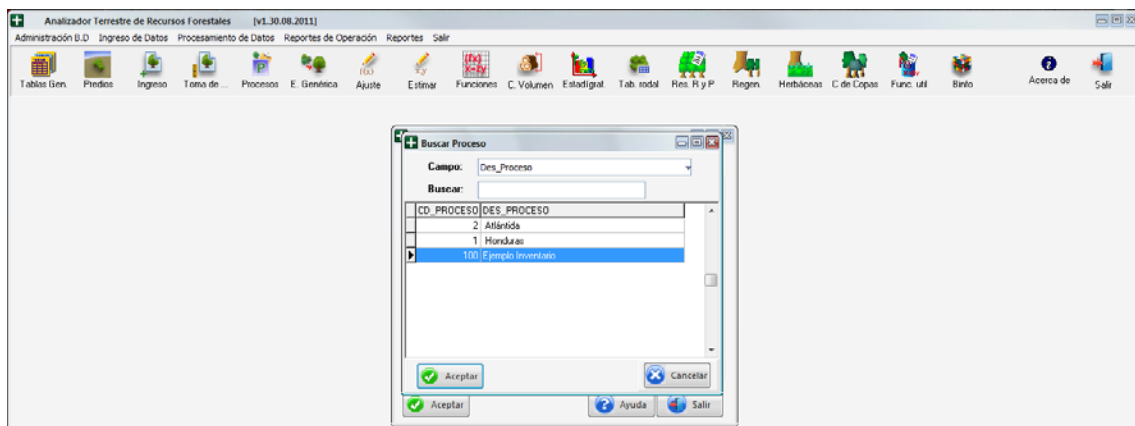
The Results module is where the user can define certain parameters. These, in turn, will then be used to do the necessary processing to obtain a specific report, or personalized reports, according to the requirements of each professional.

Given the standardization behind the system design, in this chapter it will be enough to explain the procedure to follow, which will work to produce any report with the system. The following window contains the parameters needed to generate a Stand and Inventory Table.



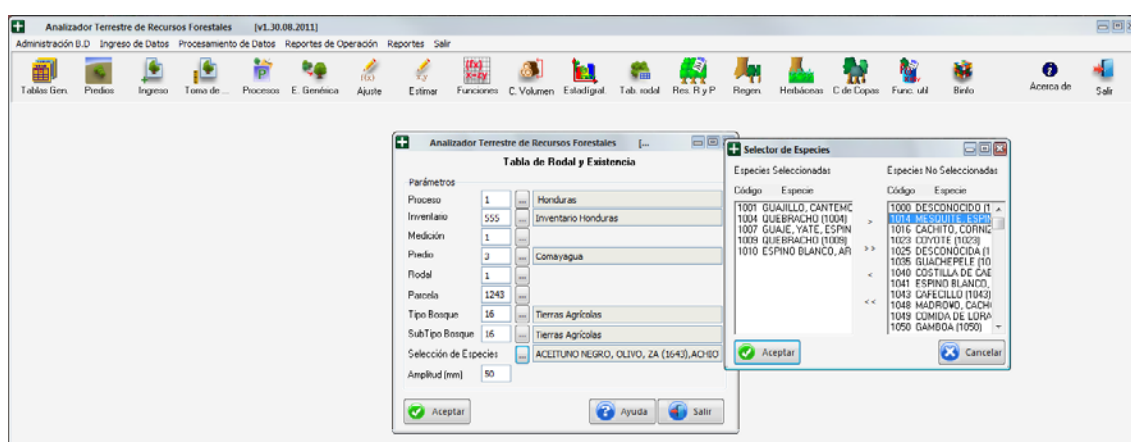
Screen with Parameters to generate a Standard Report

Enter the Process code. If not known, click the select button to choose a Process from the list. When the select button has been clicked, you will be able to see a window with the Processes to choose from, which can be seen in the following image.



Screen to select available Processes

- Enter **inventory code**, if you do not know it, press the select button and choose the inventory from the list. The Inventories displayed in the list are part of the previously selected Process.
- Enter the code for **Measurement**, if you do not know it, press the select button and choose the Measurement list. The Measurements displayed in the list are part of the chosen Process or Inventory.
- Enter the code for **Field**, if you do not know it, press the select button and choose the Field from the list. The Fields that are displayed in the list are part of the chosen Process, Inventory and Measurement.
- Enter the code for **Stand**, if you do not know it, press the select button and choose the Stand from the list. The Stands that are displayed in the list are part of the chosen Process, Inventory, Measurement and Stand.
- Enter the code for **Plot**, if you do not know it, press the select button and choose the Plot from the list. The Plots that are displayed in the list are part of the chosen Process, Inventory, Measurement, Stand and Plot.
- Select the **Tree Species** to be listed by pressing the select button. The system default displays the selection screen with all species pertaining to the selected Process. If you would like to select one or more species in particular, you must transfer the non-selected species to the Non-Selected Species box using the button. If you want to transfer all the species to the Non-Selected Species box, you must use the >> button. If you would like to transfer a single species to the Selected Species box, you must use the > button. If you would like to transfer all the species to the Selected Species box, you must use the >> button.



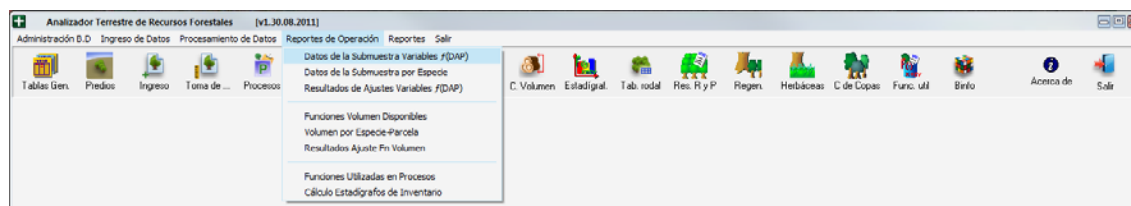
Screen to select species in Standard Report

Next, click the Accept button.

IMPORTANT

The system requires at least one PROCESS code, and particularly a specific code according to the application. Inventory, Measurement, Field, Stand, and Plot codes are optional and enable the user to filter information as needed.

8.1 Operation Reports



Although the same procedure is used to generate all System Reports, the menu is divided into two options:

- Operation Reports
- Results Reports

The only reason to do so has been for user convenience when looking for options.

In the case of Operation Reports, all reports needed for data processing have been placed there, and they are not necessarily final system results.

Operation Reports available in +BOSQUE

Subsample Data Variables f(DBH)

Displays data entered in the subsample to adjust the regression based on the independent DBH variable. Available dependent variables are: Total Height, Commercial Height, Canopy Cover, Increment, and Age.

Subsample Data by Species

Displays the total number of trees in the Process per each Tree Species, the number of sample trees included, and the percentage of these trees in relation to the total.

Results of Variable Adjustment f(DBH)

Generates a ranking of models adjusted for the selected variable, using Mean Squares Error (%) as an indicator. The Report shows the coefficients for each function, and the related statigraphs. Additionally, the user can define the function to be used for processing. The system default uses the first in the ranking.

Volume Functions Available

Displays the background for each volume feature associated with a specific Tree Species. The user is then able to select the one that is most suited to his or her needs. The system default uses the one defined in the Tree Species Table, and in case none

has been defined, it uses the one associated to the Forest Type that the Parcel is located in.

Functions Used in Processes

Models Used in Settings: Displays the used to calculate DBH (Total Height, Commercial Height, Canopy Coverage, Increment, and Age) that were used in calculating for the Process.

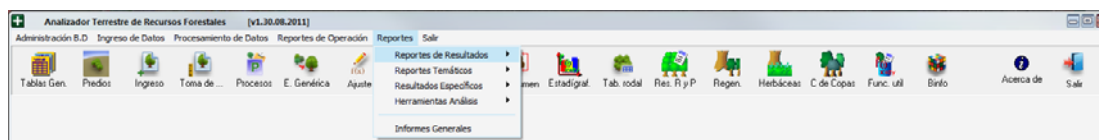
Functions Used in Volume: Displays the Volume Functions used by the system to calculate the tree sample volume in the Process selected per tree species present in the Process referred to.

Statigraph Inventory Calculation

The system calculates the Sample Error and Confidence Limits based on the user-defined parameters. For simple random sampling and systematic sampling it only requires marking the Type of Sampling, Calculate and Print the results to generate a report.

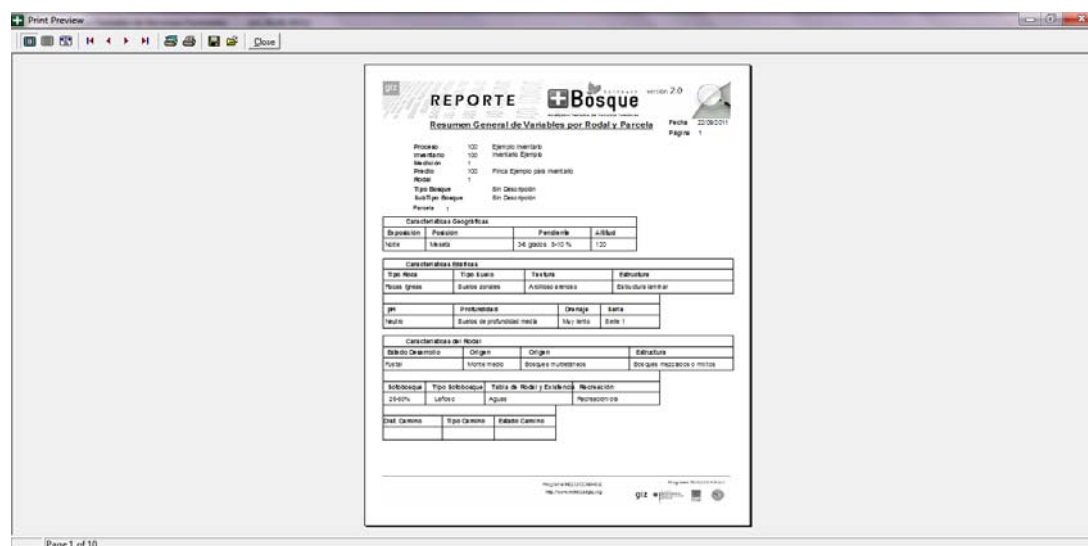
Summary – Operation Reports for +BOSQUE				Parameters: Obligatory-Optional-Not Required												
Report	Menu Title	Report Title	Description	Process	Inventory	Measurement	Field	Stand	Tree Species	Generic Species	Adjust Options	Volume Options	Error	Confidence Level	Sample Type	Parameters
Variable Adjustment																
1	Subsample Variable Data fDBH)	Data Summary for the Species Subsample	Displays input data from the subsample to adjust the regression in terms of the independent variable DBH. The available dependent variables are: Total Height, Commercial Height, Canopy Coverage, Increment, and Age.	X	---	---	---	---	---	X	---	---	---	---	---	Process code & Generic Species Code
2	Subsample Data per Species	Summary of Trees per Species	Displays the number of total trees in the Process per Tree Species, the number of sample trees included, and the percentage of these with regard to the total.	X	---	---	---	---	---	---	---	---	---	---	---	Process Code
3	Results of Variable Adjustment f(BHP)	Variable Adjustment f(DBH)	Generates a ranking of the models adjusted for a selected variable using the Mean Squares Error (%) as an indicator. The Report displays coefficients for each function and related statigraphs. With this as a base, the user can define the function to be used in processing. The system default is the first in the ranking.	X	---	---	---	---	---	X	---	---	---	---	---	Process Code & Generic Species Code
Volume Functions																
4	Available Volume Functions	Select a Volume Function	Displays the background for each volume feature associated with a specific Tree Species. The user is then able to select the one that is most suited to his or her needs. The system default uses the one defined in the Tree Species Table, and in case none has been defined, it uses the one associated to the Forest Type the Parcel is located in.	---	---	---	---	---	X	---	---	---	---	---	---	Tree Species
5	Species-Plot Volume	Volume per Species-Plot	For each Plot in the selected Process, the report provides disaggregated volumes per Tree Species	X	---	---	---	---	---	---	---	---	---	---	---	Process code
Statistical Results																
6	Functions used in Processes	Functions used in Volume	Displays the Volume Functions the System used to calculate the dependent DBH variable (Total Height, Commercial Height, Canopy coverage, Increment, & Age) used to carry out the Process calculations.	X	---	---	---	---	---	X	---	---	---	---	---	Process Code – Adjustment Option
6	Functions used in Processes	Functions used in Volume	Displays the Volume Functions the System used to calculate the tree sample volume in the selected Process for each tree species present in the Process referred to.	X	---	---	---	---	---	X	---	---	---	---	---	Process Code-Volume Option
7	Inventory Statisgraph Calculation	Confidence Limits (Simple Random Sampling & Systematic Sampling)	The system does the Sample Error and Confidence Limit calculations according to the user defined parameters. For Simple Random Sample and Systematic Sample all that is required is to mark the Sample Type, Calculate, and Print the results to generate a report.	X	*	*	*	*	*	---	---	---	X	X	X	Process Code-Inventory – Plot – Measurement- Stand- Tree Species- Maximum Admissible Error – Confidence Level – Type of Sampling
7	Inventory Statisgraph Calculation	Confidence Limits (Stratified Sampling)	The system calculates the Sample Error and Confidence Limit according to user-defined parameters. Stratified Sampling requires the user to define Strata in a specific window assigned to available plots in created Strata. Next, Calculate and Print results to generate the report.	X	*	*	*	*	*	---	---	---	X	X	X	IBID Stratified Option
				X	Obligatory			*	Optional			---	Not required			

8.2 Result Reports



Result Reports are grouped together in the Reports option. They provide final background on the processes done on the system.

First, it is possible to obtain general information about the Plots or principal sampling points, related to the physiographic, edagraphic, vegetation, and other variables that make it possible to have an initial approximation of the characteristics at the corresponding measuring point.



Example of General information results of a PSU based on the proposed inventory model

Next, using the dendrometric information in the tree sample and subsample from the Primary Sampling Unit, it is possible to obtain the most typical background processed that are needed to plan and analyze the sustainable management of the measured forest mass. Examples of these results are related to the Stand and Inventory Tables, individuals affected by phytosanitary deficiencies, canopy coverage, volume growth, and canopy type.

Print Preview

REPORTE Bosque versión 2.0


Tabla de Stock y Costos

Fecha: 22/09/2011
Página: 1

Tipo Unidad: Muestreo Conventional
Proceso: 100 Ejemplo inventario
Medición: Sin restricción
Predio: Sin restricción
Parcela:
Tipo Bosque: Sin Descripción
SubTipo Bosque: Sin Descripción
Especies seleccionadas:

Clase (cm)	cm inferior	cm superior	Área Total (m²)	Área Comercial	Volumen Total (m³)
10-15	10	15	1000	1000	1000
15-20	15	20	1000	1000	1000
20-25	20	25	1000	1000	1000
25-30	25	30	1000	1000	1000
30-35	30	35	1000	1000	1000
35-40	35	40	1000	1000	1000
40-45	40	45	1000	1000	1000
45-50	45	50	1000	1000	1000
50-55	50	55	1000	1000	1000
55-60	55	60	1000	1000	1000
60-65	60	65	1000	1000	1000
65-70	65	70	1000	1000	1000
70-75	70	75	1000	1000	1000
75-80	75	80	1000	1000	1000
80-85	80	85	1000	1000	1000
85-90	85	90	1000	1000	1000
90-95	90	95	1000	1000	1000
95-100	95	100	1000	1000	1000
100-105	100	105	1000	1000	1000
105-110	105	110	1000	1000	1000
110-115	110	115	1000	1000	1000
115-120	115	120	1000	1000	1000
120-125	120	125	1000	1000	1000
125-130	125	130	1000	1000	1000
130-135	130	135	1000	1000	1000
135-140	135	140	1000	1000	1000
140-145	140	145	1000	1000	1000
145-150	145	150	1000	1000	1000
150-155	150	155	1000	1000	1000
155-160	155	160	1000	1000	1000
160-165	160	165	1000	1000	1000
165-170	165	170	1000	1000	1000
170-175	170	175	1000	1000	1000
175-180	175	180	1000	1000	1000
180-185	180	185	1000	1000	1000
185-190	185	190	1000	1000	1000
190-195	190	195	1000	1000	1000
195-200	195	200	1000	1000	1000
200-205	200	205	1000	1000	1000
205-210	205	210	1000	1000	1000
210-215	210	215	1000	1000	1000
215-220	215	220	1000	1000	1000
220-225	220	225	1000	1000	1000
225-230	225	230	1000	1000	1000
230-235	230	235	1000	1000	1000
235-240	235	240	1000	1000	1000
240-245	240	245	1000	1000	1000
245-250	245	250	1000	1000	1000
250-255	250	255	1000	1000	1000
255-260	255	260	1000	1000	1000
260-265	260	265	1000	1000	1000
265-270	265	270	1000	1000	1000
270-275	270	275	1000	1000	1000
275-280	275	280	1000	1000	1000
280-285	280	285	1000	1000	1000
285-290	285	290	1000	1000	1000
290-295	290	295	1000	1000	1000
295-300	295	300	1000	1000	1000
300-305	300	305	1000	1000	1000
305-310	305	310	1000	1000	1000
310-315	310	315	1000	1000	1000
315-320	315	320	1000	1000	1000
320-325	320	325	1000	1000	1000
325-330	325	330	1000	1000	1000
330-335	330	335	1000	1000	1000
335-340	335	340	1000	1000	1000
340-345	340	345	1000	1000	1000
345-350	345	350	1000	1000	1000
350-355	350	355	1000	1000	1000
355-360	355	360	1000	1000	1000
360-365	360	365	1000	1000	1000
365-370	365	370	1000	1000	1000
370-375	370	375	1000	1000	1000
375-380	375	380	1000	1000	1000
380-385	380	385	1000	1000	1000
385-390	385	390	1000	1000	1000
390-395	390	395	1000	1000	1000
395-400	395	400	1000	1000	1000
400-405	400	405	1000	1000	1000
405-410	405	410	1000	1000	1000
410-415	410	415	1000	1000	1000
415-420	415	420	1000	1000	1000
420-425	420	425	1000	1000	1000
425-430	425	430	1000	1000	1000
430-435	430	435	1000	1000	1000
435-440	435	440	1000	1000	1000
440-445	440	445	1000	1000	1000
445-450	445	450	1000	1000	1000
450-455	450	455	1000	1000	1000
455-460	455	460	1000	1000	1000
460-465	460	465	1000	1000	1000
465-470	465	470	1000	1000	1000
470-475	470	475	1000	1000	1000
475-480	475	480	1000	1000	1000
480-485	480	485	1000	1000	1000
485-490	485	490	1000	1000	1000
490-495	490	495	1000	1000	1000
495-500	495	500	1000	1000	1000
500-505	500	505	1000	1000	1000
505-510	505	510	1000	1000	1000
510-515	510	515	1000	1000	1000
515-520	515	520	1000	1000	1000
520-525	520	525	1000	1000	1000
525-530	525	530	1000	1000	1000
530-535	530	535	1000	1000	1000
535-540	535	540	1000	1000	1000
540-545	540	545	1000	1000	1000
545-550	545	550	1000	1000	1000
550-555	550	555	1000	1000	1000
555-560	555	560	1000	1000	1000
560-565	560	565	1000	1000	1000
565-570	565	570	1000	1000	1000
570-575	570	575	1000	1000	1000
575-580	575	580	1000	1000	1000
580-585	580	585	1000	1000	1000
585-590	585	590	1000	1000	1000
590-595	590	595	1000	1000	1000
595-600	595	600	1000	1000	1000
600-605	600	605	1000	1000	1000
605-610	605	610	1000	1000	1000
610-615	610	615	1000	1000	1000
615-620	615	620	1000	1000	1000
620-625	620	625	1000	1000	1000
625-630	625	630	1000	1000	1000
630-635	630	635	1000	1000	1000
635-640	635	640	1000	1000	1000
640-645	640	645	1000	1000	1000
645-650	645	650	1000	1000	1000
650-655	650	655	1000	1000	1000
655-660	655	660	1000	1000	1000
660-665	660	665	1000	1000	1000
665-670	665	670	1000	1000	1000
670-675	670	675	1000	1000	1000
675-680	675	680	1000	1000	1000
680-685	680	685	1000	1000	1000
685-690	685	690	1000	1000	1000
690-695	690	695	1000	1000	1000
695-700	695	700	1000	1000	1000
700-705	700	705	1000	1000	1000
705-710	705	710	1000	1000	1000
710-715	710	715	1000	1000	1000
715-720	715	720	1000	1000	1000
720-725	720	725	1000	1000	1000
725-730	725	730	1000	1000	1000
730-735	730	735	1000	1000	1000
735-740	735	740	1000	1000	1000
740-745	740	745	1000	1000	1000
745-750	745	750	1000	1000	1000
750-755	750	755	1000	1000	1000
755-760	755	760	1000	1000	1000
760-765	760	765	1000	1000	1000
765-770	765	770	1000	1000	1000
770-775	770	775	1000	1000	1000
775-780	775	780	1000	1000	1000
780-785	780	785	1000	1000	1000
785-790	785	790	1000	1000	1000
790-795	790	795	1000	1000	1000
795-800	795	800	1000	1000	1000
800-805	800	805	1000	1000	1000
805-810	805	810	1000	1000	1000
810-815	810	815	1000	1000	1000
815-820	815	820	1000	1000	1000
820-825	820	825	1000	1000	1000
825-830	825	830	1000	1000	1000
830-835	830	835	1000	1000	1000
835-840	835	840	1000	1000	1000
840-845	840	845	1000	1000	1000
845-850	845	850	1000	1000	1000
850-855	850	855	1000	1000	1000
855-860	855	860	1000	1000	1000
860-865	860	865	1000	1000	1000
865-870	865	870	1000	1000	1000
870-875	870	875	1000	1000	1000
875-880	875	880	1000	1000	1000
880-885	880	885	1000	1000	1000
885-890	885	890	1000	1000	1000
890-895	890	895	1000	1000	1000
895-900	895	900	1000	1000	1000
900-905	900	905	1000	1000	1000
905-910	905	910	1000</		

Print Preview

REPORTE  versión 2.0

Analisis de Cobertura de Copas/Lite

Fecha: 22/08/2011
Pagina: 1

Tipo Lote: Muestreo
 Parcela: 100 Ejemplo muestreo
 Inventario: 100 muestreo Ejemplo
 Medida: 1
 Puntos: 100 Puntos Ejemplo pas muestreo
 Método:
 Parcela: SN CREC/BOCH
 Tipo Bosque: SN CREC/BOCH
 SubTipo Bosque: SN CREC/BOCH
 Especies seleccionadas: E1 (D1), E2 (D2), E3 (D3)

Clase del Bosque (m)	H.C. (m)	TF arbol (m³/m²)	Cobertura (m²/m²)	Corte (m³/m²)	Corte (m³/m²) (%)
9.00 - 10.00	10.00	8	0.14	0.04	0.01
10.00 - 11.00	10.00	8	0.17	0.02	0.01
11.00 - 12.00	20.00	42	0.28	12.18	0.12
12.00 - 13.00	20.00	38	0.31	11.18	0.11
13.00 - 14.00	20.00	34	0.28	8.34	0.08
14.00 - 15.00	38.00	26	0.33	8.24	0.08
15.00 - 16.00	40.00	8	0.29	2.02	0.02
16.00 - 17.00	40.00	4	0.17	0.68	0.01
		160		40.28	0.48

Proyecto: Muestreo de Bosques
Muestra: Muestreo de Bosques

Page 1 of 1

Example of results on Canopy Coverage based on the proposed inventory model

Print Preview


REPORTE  versión 2.0

Tabla Resumen de Crecimiento Volumétrico

Fecha: 22/08/2011
Pagina: 1

Tipo Lote: Muestreo
 Parcela: 100 Ejemplo muestreo
 Inventario: SN CREC/BOCH
 Medida: SN CREC/BOCH
 Puntos: SN CREC/BOCH
 Método:
 Parcela: SN CREC/BOCH
 Tipo Bosque: SN CREC/BOCH
 SubTipo Bosque: SN CREC/BOCH

Especie	TF arbol	Volumen m³/m²	Volumen proyectado	Incremento volumen	% de Incremento
E1 (D1)	42	21.24	21.24	0.00	0.00
E2 (D2)	38	21.24	21.24	0.00	0.00
E3 (D3)	34	21.24	21.24	0.00	0.00
	160	21.24	21.24	0.00	0.00

Proyecto: Muestreo de Bosques
Muestra: Muestreo de Bosques

Page 1 of 1

Example of results on Volume Growth based on the proposed inventory model

Print Preview

REPORTE Bosque versión 2.0

Resultados de Censos de Copas por Unidad

Fecha: 22/09/2011
Página: 1

Proceso: 132: Ejemplo inventario
Inventario: Sin inventario
Muestreo: Sin muestreo
Punto: Sin punto
Parcela: Sin parcela
Tipo de bosque: Sin tipo de bosque
Auto tipo bosque: Sin auto tipo bosque

Especies seleccionadas: 81 (31), 82 (30), 83 (20)

Censo de Copas	Nº de copas	% de Participación
Quercus	18	22.22
Castanea	30	42.86
Alnus	4	5.71
Pinus	14	20.00
Supratotal	66	93.33
	70	100.00

Page 1 of 1

Example of results on Canopy Type based on the proposed inventory model

Based on the information collected from the Secondary Sampling Units, it is possible to describe natural (and eventually artificial) regeneration in the inventoried zone. An example of a result that it is possible to glean based on the base information is shown as follows.

Print Preview

REPORTE Bosque versión 2.0

Proyecto de Regeneración por E. especie

Fecha: 02/10/2011
Página: 1

Proceso: 132: Proyecto de Regeneración por E. especie
Inventario: Sin inventario
Muestreo: Sin muestreo
Punto: Sin punto
Parcela: Sin parcela
Tipo de bosque: Sin tipo de bosque
Auto tipo bosque: Sin auto tipo bosque

Especies	Nº de copas			% de Participación		
	Nº de copas	Nº de copas	Nº de copas	% de Participación	% de Participación	% de Participación
81 (31)	1.14	0.13	2.18	3.03	88	844
82 (30)	1.58	0.06	2.47	3.03	147	300
83 (20)	0.78	0.38	1.16	2.07	88	450

Page 1 of 1

Example of results on Regeneration based on the proposed inventory model

Background from the Tertiary Sampling Units give an idea of the presence and abundance of herbaceous species and weeds in the inventoried area.

Stand and Inventory Table (defaults)

Displays the Stand and Inventory Table that results from processing the information defined in the selected parameters, showing two Volume columns: with and without defects from the perspective of timber uses.

Stand and Inventory Table (Products)

Displays the Stand and Inventory Table that results from processing the information defined in the selected parameters, differentiated by Type of Wood Product, in terms of the settings for these Products.

Summary of Variables per Plot

Displays a summary of all the variables per Plot (Geographic, Edaphic, Plant, others).

Summary Stand-Plot-Species

Displays a summary of all variables per Plot (Geographic, Edaphic, Plant, others), as well as the decametric forms obtained in data processing.

Statigraphs Geographic Variables

At the Stand level, it provides a summary of the Geographic Variables as defined for the Stand parcel.

Statigraphs on Plant Variables

Provides a summary of the Stand level of Plant Variables defined in the Stand plots.

Statigraphs Other Variables

Provides a summary at the Stand level of the Other Variables defined in the Stand Plots.

General Summary – Edaphic variables

Displays plot by plot edaphic variables in the inventory.

Statigraphs Edaphic Variables

Presents a summary at the Stand level of the Edaphic Variables defined in Stand plots.

Summary Affected Trees

For each Symptom-Sign and Agent combination, there is the number of trees per Species, and the participation - as a percentage - within the total number of trees for the selection parameters.

Summary Affected Trees Stand-Species

For each Symptom-Sign and Agent combination, there is the number of trees per Species, and the participation - as a percentage - within the total number of trees for the selection parameters.

Diameter Class of Affected Trees

Divides the diametric distribution in three ranges (superior, intermediate and superior) and each range displays a number of trees and the proportion in the total number of trees according to the Symptom-Sign and Agent, according to the established parameters.

Summary per Diameter Class

Displays, for three diametric angles, the distribution for three ranges (superior, intermediate and superior) from the Symptom signs of the present Agents, according to the parameters established.

Regeneration per Species

Per species, in the parameter setting selection presents medium and lower limit and upper limit values, as long as there is plant height and the number of plants per hectare.

Regeneration per Height Class

Using the measure of height defined by the user, this generates a series of height ranges that display the actual number of plants per hectare, according to the established parameters.

Participation per Species

Displays the number of plants, percentages, and the maximum and minimum heights per species according to the selected parameters.

Growth per Species

Per species present in the selected parameters, this displays the value of actual volume and the volume increase for the user-defined number of years.

Projected Stand Table

This generates a Stand and Inventory Table with increases for DBH values, for Height and Volume for the time period defined by the user in the inventory.

Percentage of Growth

Per species present in the selected parameters, this displays the values of percentages of volume growth: simple Interest, Compound Interest, Kunze, Presseler and Jonson.

Canopy Types per Species

Per species defined in the selection, this displays the number of trees and percentages in the Canopy Classes defined by Kraft.

Canopy Types – Participation

Per species and plot defined in the parameter settings, this displays the number of trees per hectare and the percentages in the total number of trees per Kraft Canopy Class.

Canopy Types – Age

Displays the relationship between Age and Canopy Class (as per Kraft Classification of Canopies).

Canopy coverage

Organized as a Stand Table (by Diametric Classes) this presents the values for Canopy coverage in m²/ha and the percentage according to the established parameters.

Herbaceous species

In the Summary option, this displays the number of plants per hectare and percentages by the total per herbaceous species present in the selection of sample units. The Detail option displays the same information for each parcel selected.

Dead Wood

Displays the volume of dead wood per decomposition category (solid, intermediate, and decomposed) from processing the line transects that appeared in the parcels in the set parameters.

Litter

Provides the Litter Median Depth, the number of measurement points and the volume of litter per hectare of each of the parcels included in the selection.

Biomass Branches and Canopy

Displays biomass of branches and Canopies per diametric class, based on the FEB (Factor of Carbon Expansion), related to the volume of problems.

Displays the biomass in Branches and Canopies per diametric class, estimated based on FEB (Factor of Expansion of Carbon) associated with the number of shafts according to the class of diameter and kind of species (conifer and leafy).

Carbon per Component

Presents a summary of volume, biomass, and inventory of carbon for the different components present in the forest according to the selection of sample units in the parameter settings.

Biodiversity Indicators

Provides a series of Indicators for Plant Biodiversity based on information from the inventory. The level of aggregation depends on the parameter settings at the moment of creating the report.

Degradation Indicators

Presents a series of Indicators for Forest Degradation (FDI) based on information from the inventory. The level of aggregation depends on the parameter settings at the time of creating the report.

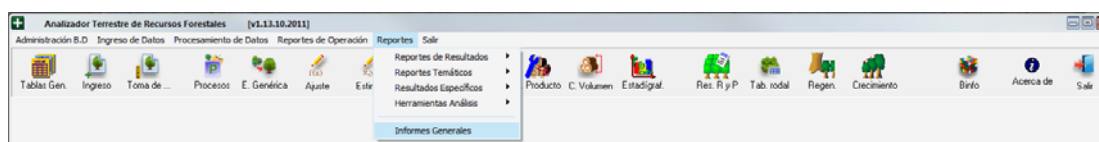
Resumen Reportes de Resultados de +BOSQUE (1 de 4)				Parámetros Obligatorios-Opcionales-No Requeridos																
Reporte	Título Menú	Título Reporte	Descripción	Proceso	Inventario	Medición	Predio	Rodal	Parcela	Especie(s) Arbórea(s)	Amplitud (mm)	Amplitud (m)	Error	UMS	UMT	Especie(s) Herbácea (s)	Detalle / Resumen	Tipo Variable	Parámetros	
Tablas de Rodal y Resúmenes																				
1	Tabla de Rodal y Existencia	Tabla de Rodal y Existencia	Muestra la Tabla de Rodal y Existencia resultante del procesamiento de la información definida en los parámetros seleccionados.	X	*	*	*	*	*	*	X	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela Especie(s) Arbórea(s) - Amplitud (mm)
2	Tabla de Rodal y Existencia (defectos)	Tabla de Rodal y Existencia (defectos)	Muestra la Tabla de Rodal y Existencia resultante del procesamiento de la información definida en los parámetros seleccionados, mostrando dos columnas de Volumen: con y sin defectos desde el punto de vista del aprovechamiento maderero.	X	*	*	*	*	*	*	X	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela Especie(s) Arbórea(s) - Amplitud (mm)
3	Tabla de Rodal y Existencia (Productos)	Tabla de Rodal y Existencia (Productos)	Muestra la Tabla de Rodal y Existencia resultante del procesamiento de la información definida en los parámetros seleccionados, diferenciada por Tipo de Producto maderable, en función de una configuración de dichos Productos.	X	*	*	*	*	*	*	X	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela Especie(s) Arbórea(s) - Amplitud (mm)
4	Resumen Variables por Parcela	Resumen General de Variables por Rodal y Parcela	Muestra un resumen de todas la variables por Parcela (Geográficas, Edáficas, Vegetacionales, otras).	X	*	*	*	*	---	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal
5	Resumen Rodal-Parcela-Especie	Resumen Rodal-Parcela-Especie	Muestra un resumen de todas la variables por Parcela (Geográficas, Edáficas, Vegetacionales, otras), además de las variables dasométricas obtenidas del procesamiento.	X	X	X	X	X	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie Arbórea
Resultado Variables																				
6	Estadígrafos Variables Geográficas	Resumen General de Variables Geográficas	Entrega un resumen a nivel de Rodal de las Variables Geográficas definidas en las parcelas del Rodal.	X	*	*	*	*	---	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal
7	Estadígrafos Variables Vegetacionales	Estadígrafos Variables Vegetacionales	Entrega un resumen a nivel de Rodal de las Variables Vegetacionales definidas en las parcelas del Rodal.	X	*	*	*	*	---	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal
8	Estadígrafos Otras Variables	Estadígrafos Otras Variables	Entrega un resumen a nivel de Rodal de las Otras Variables definidas en las parcelas del Rodal.	X	*	*	*	*	---	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal
9	Resumen General de variables Edáficas	Resumen General de variables Edáficas	Muestra parcela por parcela las variables edáficas recogidas en el inventario.	X	*	*	*	*	---	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal
10	Estadígrafos Variables Edáficas	Estadígrafos Variables Edáficas	Entrega un resumen a nivel de Rodal de las Variables Edáficas definidas en las parcelas del Rodal.	X	*	*	*	*	---	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal
				X	Obligatorio			*	Opcional			--- No requerido								

Resumen Reportes de Resultados de +BOSQUE (2 de 4)				Parámetros Obligatorios-Opcionales-No Requeridos																
Reporte	Título Menú	Título Reporte	Descripción	Proceso	Inventario	Medición	Predio	Rodal	Parcela	Especie(s) Arbórea(s)	Amplitud (mm)	Amplitud (m)	Error	UMS	UMT	Especie(s) Herbácea (s)	Detalle / Resumen	Tipo Variable	Parámetros	
Estado Fitosanitario																				
11	Resumen Arboles Afectados	Resumen Arboles Afectados	Para cada combinación de Síntoma-Signo y Agente presenta el número de árboles por Especie y su participación porcentual dentro del total de árboles para la selección parametrizada.	X	*	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s)
12	Resumen Arboles Afectados Rodal-Especie	Resumen Arboles Afectados Rodal-Especie	Para cada Síntoma-Signo y Agente por separado presenta el número de árboles según la(s) Especie(s) seleccionadas y su participación porcentual dentro del total de árboles para la selección parametrizada.	X	*	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s)
13	Arboles Afectados Clase Diámetro	Arboles Afectados Clase Diámetro	Divide la distribución diamétrica en tres rangos (superior, intermedio y superior) y en cada rango muestra el número de árboles y su proporción dentro del total de árboles de acuerdo a la combinación de Síntoma-Signo y Agente, de acuerdo a la parametrización realizada.	X	*	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s)
14	Resumen por Clase Diámetro	Resumen por Clase Diámetro Especie-Rodal-Parcela	Muestra, para tres rangos diamétricos extraídos de la distribución (superior, intermedio y superior) los Síntomas-Signos y los Agentes presentes, de acuerdo a la parametrización realizada.	X	*	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s)
Regeneración																				
15	Regeneración por Especie	Promedio Regeneración por Especie	Para cada especie presente en la selección parametrizada presenta los valores medio y límites inferior y superior tanto de altura de plantas como de número de plantas por hectárea.	X	*	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s)
16	Regeneración por Clase de Altura	Tabla de Rodal Estudio de Regeneración por Hectárea	Utilizando una amplitud de altura definida por el usuario, genera una serie de rangos de altura en los cuales muestra el número de plantas por hectárea existentes de acuerdo a la parametrización realizada.	X	*	*	*	*	*	*	---	X	---	*	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - UMS - Especie(s) Arbórea(s) - Amplitud Altura (m)
17	Participación por Especie	Resumen Porcentaje de Participación por Especie	Muestra el número de plantas, su participación porcentual y los límites máximos y mínimos de altura para cada especie de acuerdo a la selección parametrizada.	X	*	*	*	*	*	*	---	---	---	*	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - UMS
Crecimiento																				
18	Crecimiento por Especie	Tabla Resumen de Crecimiento Volumétrico	Para cada especie presente en la selección parametrizada presenta los valores de volumen actual, proyectado e incremento volumétrico para el periodo de años definido para el inventario.	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela
19	Tabla de Rodal Proyectada	Tabla de Rodal Proyectada	Genera una Tabla de Rodal y Existencia con valores incrementados del DAP, la Altura y el Volumen para el periodo de años definido en el Inventario.	X	*	*	*	*	*	*	X	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s) - Amplitud (mm)
20	Crecimiento Porcentual	Crecimiento Porcentual	Para cada especie presente en la selección parametrizada presenta los valores de crecimiento volumétrico porcentual: Interés Simple, Interés Compuesto, Kunze, Pressler y Jonson.	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela
				X	Obligatorio			*	Opcional			---				No requerido				

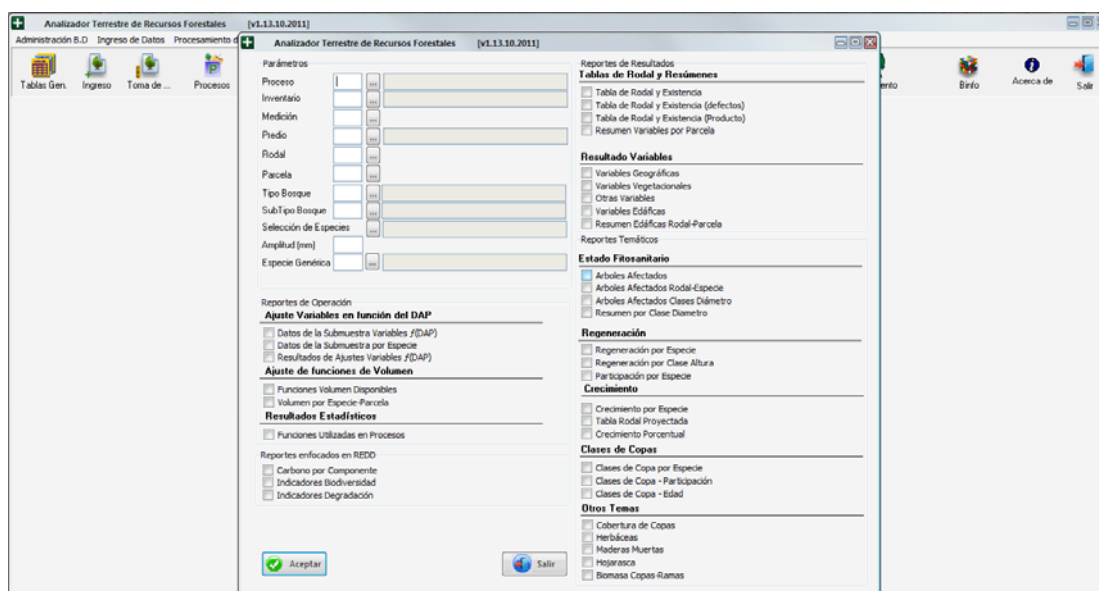
Resumen Reportes de Resultados de +BOSQUE (3 de 4)				Parámetros Obligatorios-Opcionales-No Requeridos																	Parámetros	
Reporte	Título Menú	Título Reporte	Descripción	Proceso	Inventario	Medición	Predio	Rodal	Parcela	Especie(s) Arbórea(s)	Amplitud (mm)	Amplitud (m)	Error	UMS	UMT	Especie(s) Herbácea (s)	Detalle / Resumen	Tipo Variable				
Clases de Copa																						
21	Clases de Copa por Especie	Resultados de Clase de Copa por Hectárea	Muestra para cada especie definida en la selección el número de árboles y su participación porcentual según las Clases de Copa definidas por Kraft.	X	*	*	*	*	*	*	X	---	---	---	---	---	X	X	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s) - <u>Amplitud (mm)</u> - Opción Detalle/Resumen			
22	Clases de Copa - Participación	Porcentaje de Participación de Clases de Copa para cada Especie	Para cada especie y parcela definida en la parametrización, muestra el número de árboles por hectárea y su porcentaje de participación en el total de árboles según las Clases de Copa de Kraft.	X	*	*	*	*	*	*	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s)			
23	Clases de Copa - Edad	Relación Clases de Copa - Edad	Permite visualizar la relación entre la Edad y las Clases de Copas (según la Clasificación de Copas de Kraft).	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela			
Otros Temas																						
24	Cobertura de Copas	Análisis de Cobertura de Copas	Organizado a la forma de una Tabla de Rodal (según Clases Diamétricas) presenta los valores de Cobertura de Copas en m²/ha y porcentaje de acuerdo a la parametrización efectuada.	X	*	*	*	*	*	*	X	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s) - Amplitud (mm)			
25	Herbáceas	Resumen Número de Herbáceas por Hectárea	En la opción Resumen muestra el número de plantas por hectárea y su participación porcentual con respecto al total para cada especie herbácea presente en la selección de unidades muestrales seleccionadas. En la opción Detalle se muestra la misma información para cada parcela seleccionada.	X	*	*	*	*	*	---	---	---	---	---	*	*	X	X	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - UMT - Especie(s) Herbácea (s) - Opción Detalle/Resumen			
Biomasa y Carbono																						
27	Maderas Muertas	Volumen Maderas Muertas	Muestra los volúmenes de maderas muertas por categoría de descomposición (sólido, intermedio y descompuesto) proveniente del procesamiento de las líneas de transecto materializadas en las parcelas presentes en la parametrización realizada.	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela			
28	Hojarasca	Resultados Volumen de Hojarasca	Entrega la Profundidad Media de Hojarasca, el número de puntos de medición y el volumen de hojarasca por hectárea de cada una de las parcelas incluidas en la selección realizada.	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela			
29	Biomasa Ramas y Copa	Resultados Biomasa Ramas y Copas	Muestra por clase diamétrica la biomasa de Ramas y Copas estimada a partir de FEB (Factor de Expansión de Carbono) asociados al volumen de fustes según su clase de diámetro y tipo de especie (coníferas y frondosas).	X	*	*	*	*	*	*	X	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Especie(s) Arbórea(s) - Amplitud (mm)			
30	Carbono por Componente	Resultado Biomasa y Carbono por Componente	Presenta un resumen de volúmenes, biomasa y existencias de carbono para los distintos componentes presentes en el bosque de acuerdo a la selección de unidades muestrales parametrizada.	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela			
				X	Obligatorio			*	Opcional			---			No requerido							

Resumen Reportes de Resultados de +BOSQUE (4 de 4)				Parámetros Obligatorios-Opcionales-No Requeridos																	
Reporte	Título Menú	Título Reporte	Descripción	Proceso	Inventario	Medición	Predio	Rodal	Parcela	Especie(s) Arbórea(s)	Amplitud (mm)	Amplitud (m)	Error	UMS	UMT	Especie(s) Herbácea (s)	Detalle / Resumen	Tipo Variable	Parámetros		
Indicadores																					
31	Indicadores de Biodiversidad	Indicadores de Biodiversidad Vegetal	Entrega una serie de Indicadores de Biodiversidad Vegetal a partir de información capturada en el inventario. El nivel de agregación depende de la parametrización efectuada al solicitar el reporte.	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela	
32	Indicadores de degradación	Indicadores de Degradación de Bosques	Entrega una serie de Indicadores de Degradación de Bosques a partir de información capturada en el inventario. El nivel de agregación depende de la parametrización efectuada al solicitar el reporte.	X	*	*	*	*	*	---	---	---	---	---	---	---	---	---	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela	
Herramientas de Análisis																					
33	Agregar y Desagregar	Proceso de Agregación y Desagregación de Rodales	Permite reagrupar las unidades muestrales de un inventario, generando una nueva rodalización de acuerdo a los criterios del usuario. A partir de estos nuevos rodales es posible reprocesar el inventario (postprocesamiento) para lograr distribuciones de unidades muestrales más homogéneas.	X	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	Proceso	
34	Comparación de Variables	Resumen de Comparación de Variables	Permite comparar valores de distinto tipo de variables entre dos rodales, dos parcelas o un rodal con una parcela a fin de determinar el grado de similitud o diferencias entre ellas.	X	X	X	X	X	X	---	---	---	X	---	---	---	---	---	X	Código Proceso - Inventario 1 y 2 - Medición 1 y 2 - Predio 1 y 2 - Rodal 1 y 2 - Parcela 1 y 2 - Error - Tipo de Variable	
35	Combinación de Variables	Combinación de Variables	Visualiza los valores de distintas variables para cada parcela de un rodal en relación a una variable seleccionada con el objetivo de verificar similitudes o diferencias entre parcelas y tendencias de las variables.	X	X	X	X	---	---	---	---	---	---	---	---	---	---	---	X	Código Proceso - Inventario - Medición - Predio - Variable de Comparación - Tipos de Variables	
36	Estudio de Tiempo	Estudio de Tiempo	Permite determinar los tiempos promedios de tslado y ejecución de parcelas asociados a mediciones dce tiempo realizadas en la ejecución del inventario.	X	*	*	*	*	*	---	---	---	X	---	---	---	---	X	---	Código Proceso - Inventario - Medición - Predio - Rodal - Parcela - Error Máximo - Nivel de Confianza - Población (N) - Opción Resumen/Detalle	
				X	Obligatorio			*	Opcional			---	No requerido								

8.3 General Reports



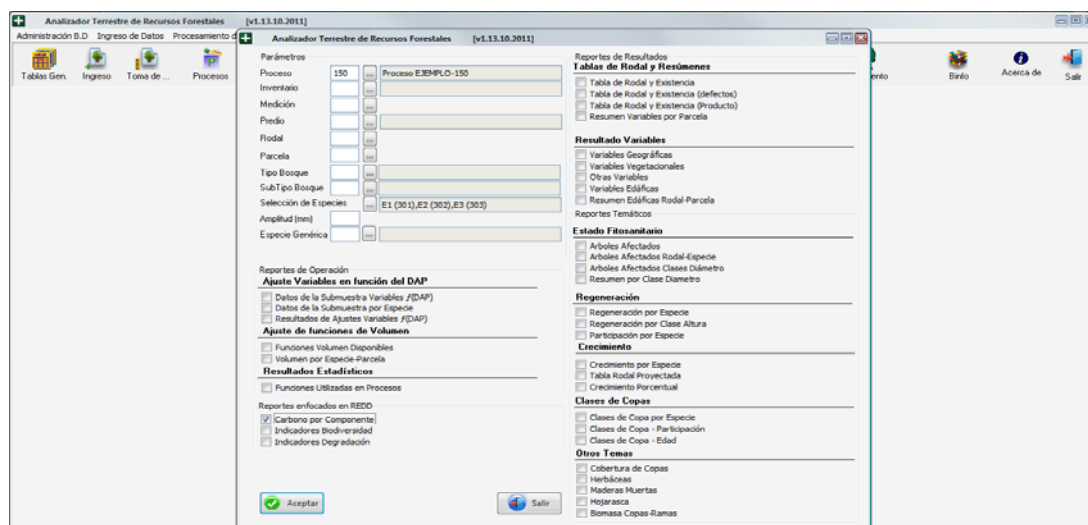
Finally, with regard to reports, and to facilitate potential users' actions, the window for the Option Reports - General Reports groups together the parameter window (upper left corner) as well as a list of reports classified by theme. This makes obtaining and analyzing system information quicker.



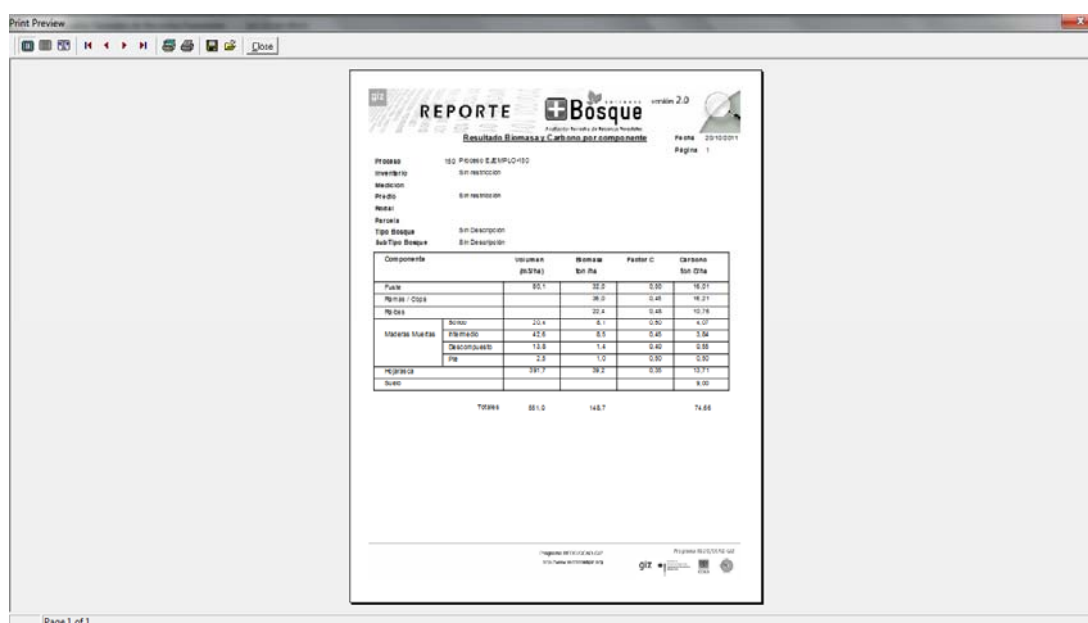
Screen for General Reports including parameter window and reports by theme

On this screen it is possible to set parameters, and to request one or more reports in a sequence or group by marking the corresponding box for the desired report. Report types and output format are among the Reports Menu options; however, they are all grouped together on the same screen.

The following is an example. If we select a Process (minimum information required to obtain any Report), and we check the Carbon Report by component as in the image below, then we would get a Report like the one that follows it.



Screen for General Reports with PROCESS selected, and requesting the Carbon Report per Component



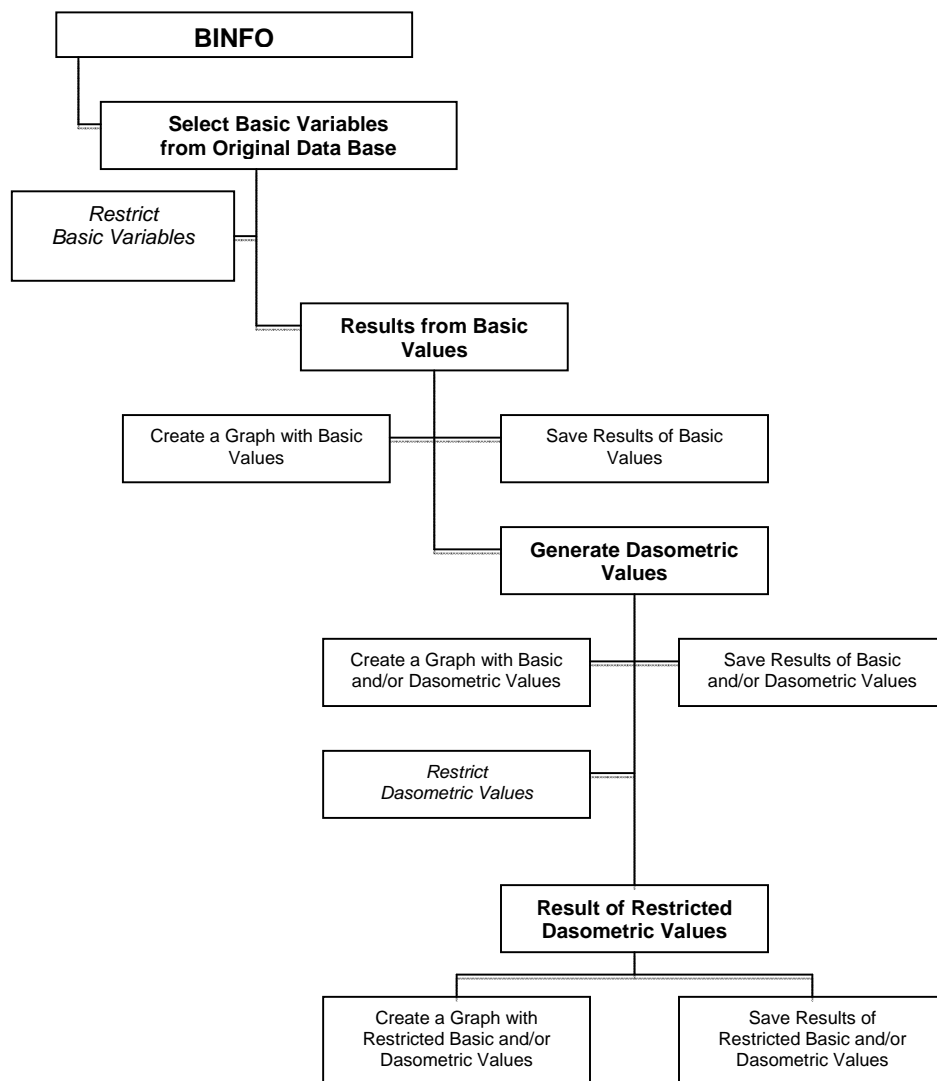
Carbon per Component Report for the PROCESS selected in the General Reports screen

To the extent that setting parameters is restricted, the results will be filtered, and it will also be possible to select new reports – with the same parameter settings – as needed by the user.

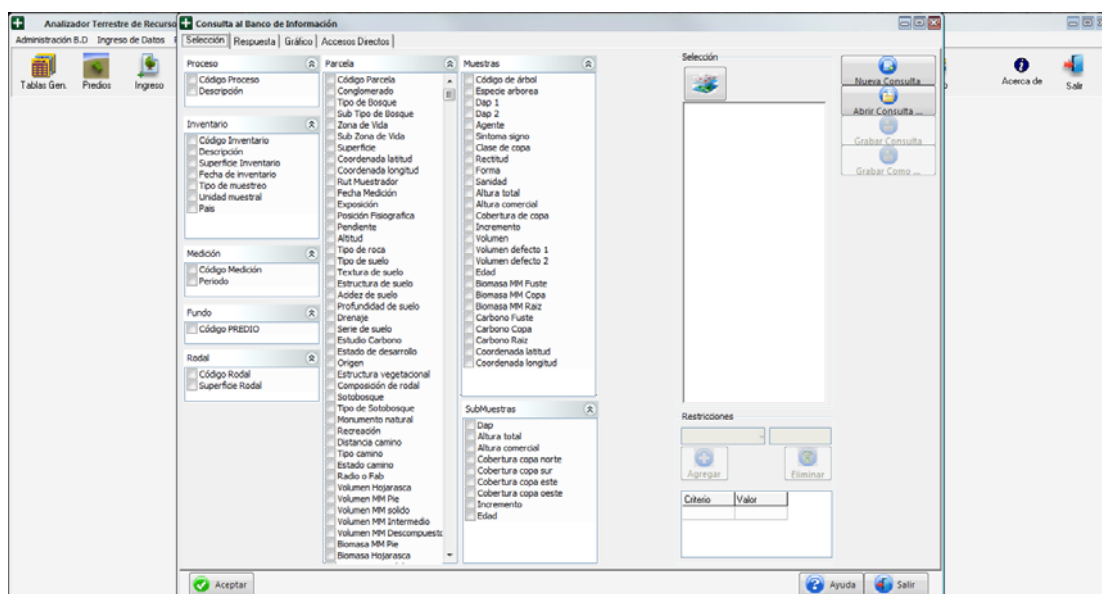
9. BINFO (QUERY ENGINE)

"BINFO" is an engine that has a hierarchically ordered database in terms of the basic variables entered at different levels (Process, Inventory, Measurement, Field, Stand, Tree, etc.), as well as variables that are obtained by processing this information that makes it possible to do restrict information selection as deemed convenient by the user, and to be able to create graphs of the "Response" information to present tendencies or specific data required in particular cases.

Schematically, BINFO can be represented in the following basic structure:



When this option is entered, the system query screen is displayed.



BINFO initial Query screen

IMPORTANT

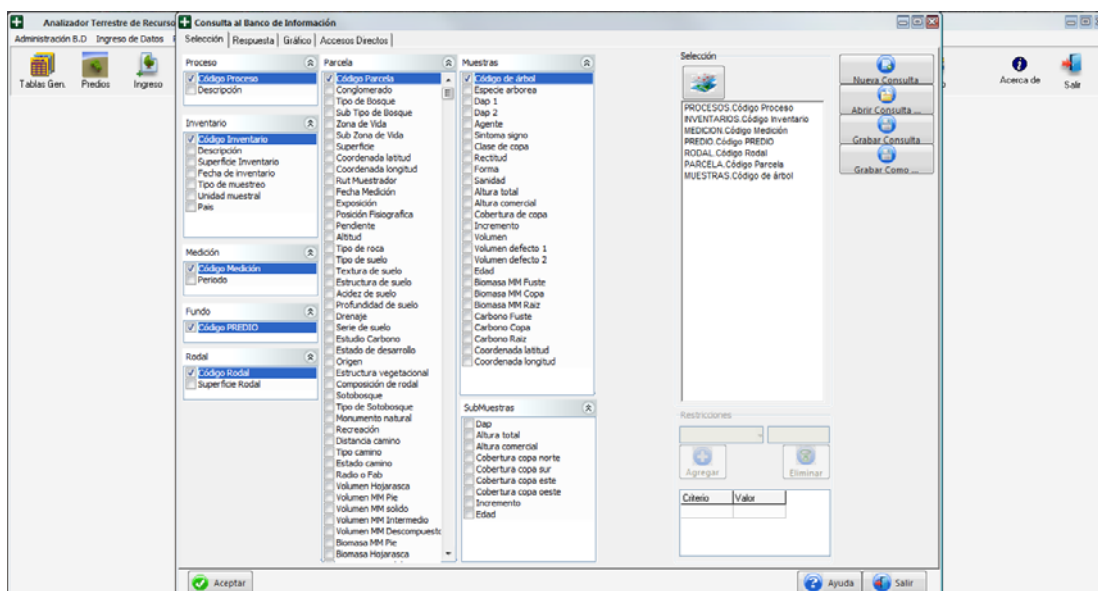
BINFO query is a product with great potential. Among other characteristics, it enables users to consult in a quick and friendly manner a great amount of information, construct and restrict selected information using different criteria, and to produce graphics with the selected information.

9.1 Usage Procedure

Selection

Query variables must be selected by checking the boxes to the left of each of the variables available on the main screen.

The selected variables will be placed in the Selection Window located to the right of the BINFO main screen, and the variable will remain highlighted with a blue background in the original position of each variable.



BINFO Query Engine Initial Screen with Variable Selection to be Consulted – SELECTION Window

If you want to eliminate the variable from the selection, it is only necessary to uncheck the box that corresponds to that variable.

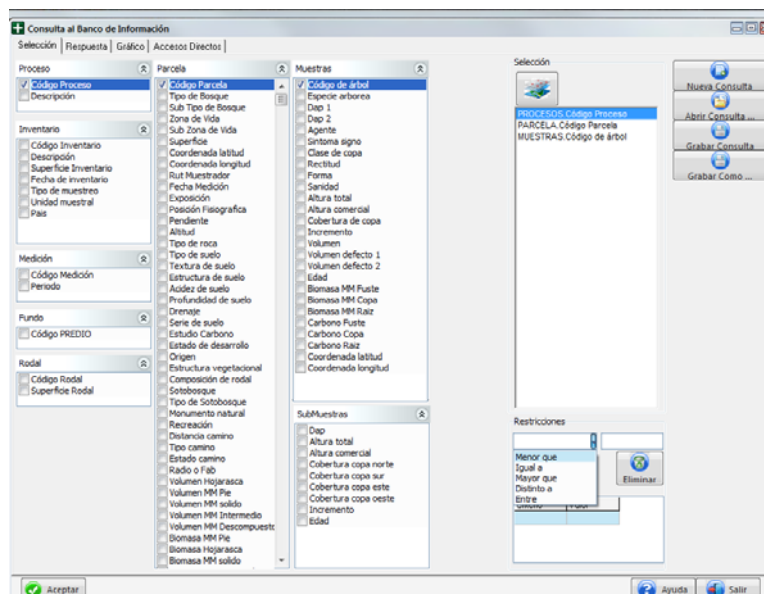
Restrictions

Once all the variables of interest have been incorporated, restrictions can be made on the selected variables by clicking on the specific variable.

This will light up the group of restrictions, making it possible to activate the corresponding restriction by clicking on the restriction box that presents the options of available restrictions. Once the restriction has been selected it is necessary to write the value that corresponds to the restriction in the editing box. In the case of range restrictions, the values must be separated by a blank space (between 10 50). Then press the Add button in the group of restrictions to incorporate the criteria and click the Accept button to execute the query.

IMPORTANT

Normally in a BINFO query it will be necessary to RESTRICT the “Process Code” to generate results for a particular PROCESO, and not combine different inventory processes.



BINFO Query Engine Initial Screen with Variable Selection to be Consulted –Selector for Restrictions of Variables

The following Buttons are available in the upper right of the selection screen.



From top to bottom they are as follows:

1. **NEW QUERY** button: This button clears the window making it possible to generate a new query.
2. **OPEN QUERY** button: This button makes it possible to open an existing query. This is very convenient in that it is not necessary to build a query each time.
3. **QUERY RECORD** button: This button allows the user to save a query.

4. **SAVE AS** button: This button lets the user save an existing query by another name in the unit the user selects.

Results

Once the query process is complete, the system displays the results window. This window comprises two grids. The top grid shows the results of the user requested variables in columns. In each selected column, the bottom grid displays the values for the Standard Deviation, Variance, Average, Maximum, Minimum, and the option to create graphs. The graph option makes it possible to mark the variables that the user wants to present, and then press the graph button.

	PRO_CODIGO	PAR_CODIGO
	100	1
	100	2
	100	3
	100	4
	100	5
	100	6
	100	7
	100	8
	100	9
	100	10

	PRO_CODIGO	PAR_CODIGO
Desviación Estándar	0.00	3.03
Varianza	0.00	9.17
Media	100.00	5.50
Máximo	100.00	10.00
Mínimo	100.00	1.00
Gráfico		

BINFO Query Engine Results Screen. The Query result is at top, and the statistical values associated to each variable at the bottom

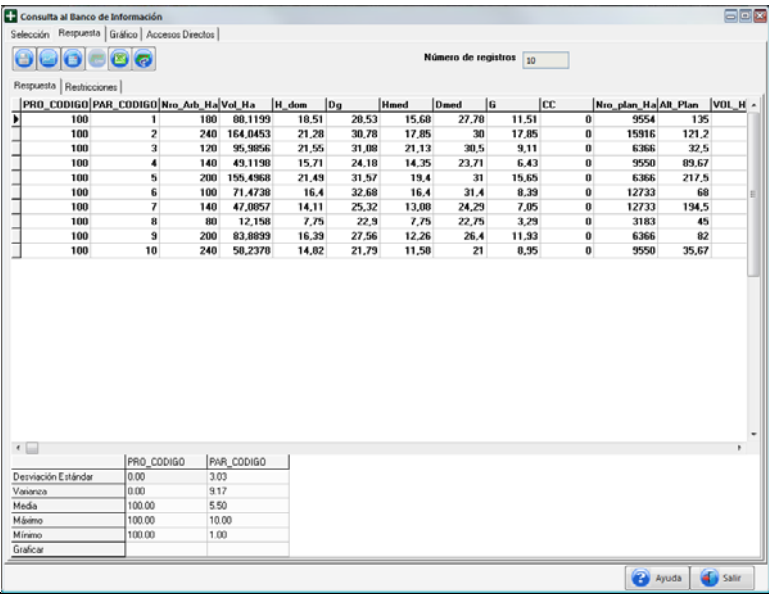
The following Buttons are available on the top left of the Results screen.



From left to right, they are as follows:

1. Save response
2. Generate a graph according to the selected variables
3. Calculate variable statistics
4. Calculate dasometric variables for the result
5. Export results to Excel
6. Export results to a .CVS file to be used in SIG

Generate Dasometric Variables: When the Calculate Dasometric Values button is pressed, the system adds dasometric variable columns to the selection, such as the number of trees per hectare, volume per hectare, dominant height, mean diameter, mean height, base area, biomass, carbon, etc.



Consulta al Banco de Información

Selección Respuesta Gráfico Accesos Directos

Número de registros: 10

Respuesta Restricciones

PRO_CODIGO	PAR_CODIGO	Nro_Arb	Ha/Vol_Ha	H_dom	Dg	Hmed	Dmed	G	CC	Nro_plan_Ha	AB_Plan	VOL_H
100	1	100	88.1199	10.51	20.53	15.60	27.70	11.51	0	9554	135	
100	2	240	164.0453	21.28	30.78	17.85	30	17.85	0	15916	121.2	
100	3	120	95.9856	21.55	31.08	21.13	30.5	9.11	0	6366	32.5	
100	4	140	49.1190	15.71	24.18	14.35	23.71	6.43	0	9550	89.67	
100	5	200	155.4968	21.49	31.57	19.4	31	19.65	0	6366	217.5	
100	6	100	71.4738	16.4	32.68	16.4	31.4	8.39	0	12733	68	
100	7	140	47.0857	14.11	25.32	13.08	24.29	7.05	0	12733	194.5	
100	8	80	12.158	7.75	22.9	7.75	22.75	3.29	0	3183	45	
100	9	200	83.8899	16.39	27.56	12.26	26.4	11.93	0	6366	82	
100	10	240	58.2370	14.82	21.79	11.50	21	8.95	0	9550	35.67	

	PRO_CODIGO	PAR_CODIGO
Desviación Estándar	0.00	3.03
Varianza	0.00	9.17
Medio	100.00	5.50
Máximo	100.00	10.00
Mínimo	100.00	1.00
Gráfico		

Ayuda Salir

BINFO Query Engine Results Screen. The results for the dasometric variable calculation is added to the right of the grid

When the Calculate Statistics button is pressed, the system generates dasometric variables in columns in the bottom grid. These variables can be incorporated into a graph if so desired.

Consulta al Banco de Información

Selección Respuesta Gráfico Accesos Directos

Número de registros 10

Respuesta Restricciones

PRO_CODIGO	PAR_CODIGO	Nro_Arb_Ha	Vol_Ha	H_dom	Dg	Hmed	Dmed	G	CC	Nro_plan_Ha	Ab_Plan	VOL_H
100	1	100	80.1193	10.51	28.53	15.68	27.70	11.51	0	9554	135	
100	2	240	164.0453	21.28	30.78	17.85	30	17.85	0	15916	121.2	
100	3	120	95.9856	21.55	31.08	21.13	30.5	9.11	0	6366	32.5	
100	4	140	49.1190	15.71	24.18	14.35	23.71	6.43	0	9550	89.67	
100	5	200	195.4968	21.49	31.57	19.4	31	15.65	0	6366	217.5	
100	6	100	71.4738	16.4	32.68	16.4	31.4	8.39	0	12733	68	
100	7	140	47.0857	14.11	25.32	13.08	24.29	7.05	0	12733	194.5	
100	8	80	12.158	7.75	22.9	7.75	22.75	3.29	0	3183	45	
100	9	200	83.8899	16.39	27.56	12.26	26.4	11.93	0	6366	82	
100	10	240	50.2370	14.82	21.79	11.58	21	8.95	0	9550	35.67	

	PRO_CODIGO	PAR_CODIGO	Nro_Arb_Ha	Vol_Ha	H_dom	Dg	Hmed	Dmed
Desviación Estándar	0.00	3.03	56.41	47.40	4.24	3.91	3.99	3.00
Varianza	0.00	9.17	3182.22	2245.68	18.01	15.28	15.93	14.41
Medio	100.00	5.50	164.00	82.56	16.00	27.64	14.96	26.00
Máximo	100.00	10.00	240.00	164.05	21.55	32.68	21.13	31.40
Mínimo	100.00	1.00	80.00	12.16	7.75	21.79	7.75	21.00

Ayuda Salir

BINFO Query Engine Results Screen. At the bottom of the results screen statistical values have been calculated for the dasometric variables generated in the previous step

The restrictions palette is used to restrict calculated variables, and to generate a new response if so desired.

Consulta al Banco de Información

Selección Respuesta Gráfico Accesos Directos

Número de registros 3

Respuesta Restricciones

Número de árboles/ha
 Volumen (m³/ha)
 Altura Dominante
 Diámetro cuadrático nuevo
 Altura media
 Diámetro medio
 Área Basal
 Cobertura de Copas
 Incremento (m³/ha)
 N° de Plantas / ha
 Número de herbáceas y malezas/ha
 N° herbáceas y Malezas/ha

Restricciones

Entre 100 150

Menor que

Igual a

Mayor que

Distinto a

Entre 100 150

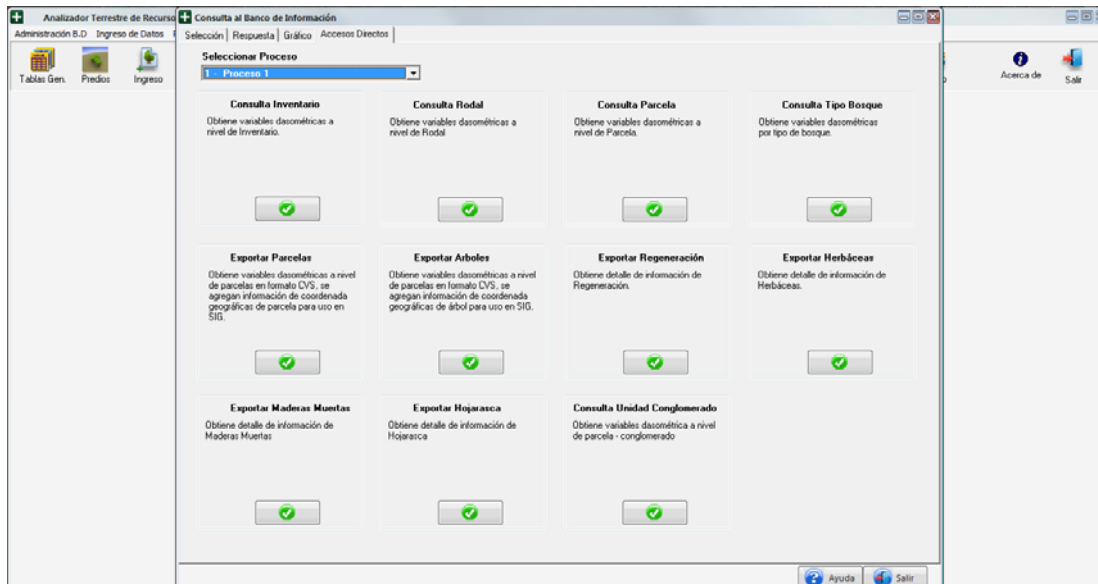
Eliminar

Ayuda Salir

BINFO Query Engine Results Screen. Restrictions PALETTE. Restrictions are added to the available Dasometric variables.

9.2 Direct Accesses:

The BINFO Query Engine also has a Direct Access palette, where it is possible to get information quickly by simply choosing the desired Process.



BINFO Query Engine Direct Access Screen. Direct Access PALETTE.

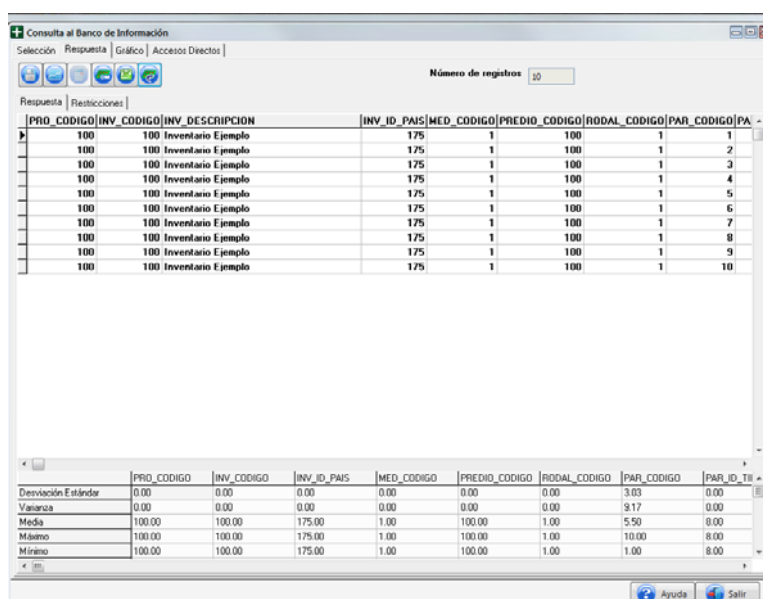
The Direct Access option includes the following alternatives to generate information:

- **Inventory Query:** Presents dasometric variables at the inventory level.
- **Stand Query:** Presents dasometric variables at the stand level.
- **Plot Query:** Presents dasometric variables at the plot level.
- **Forest Type Query:** Presents dasometric variables per Forest Type.
- **Plot Export:** Presents dasometric variables at the Plot level in .CVS format, geographical coordinate information on the Plots is added for use in SIG.
- **Tree Export:** Presents dasometric variables at the Plot level in .CVS format, geographical coordinate information on the Trees is added for use in GIS
- **Regeneration Export:** Presents detailed information on regeneration subplots in .XLS format.
- **Herbaceous species Export:** Presents detailed information on herbaceous species subplots in .XLS format.
- **Dead Wood Export:** Presents detailed information on Line Transects for dead wood in .XLS format.
- **Litter Export:** Presents detailed information on litter measurements in .XLS format.
- **Unit Conglomerate Query:** Presents dasometric variables at the level of Plots for each Conglomerate.

Using Direct Access buttons is very simple. Basically, select the Process from the list of available Processes on the top left of the screen. Next, press the ACCEPT button in any of the information options available on screen.

In the case of Exports, the user will be requested to assign a name and location to the Export files.

The results of the Direct Query are shown in the Results palette, just as any other query generated with BINFO.



Consulta al Banco de Información

Selección | Respuesta | Gráfico | Accesos Directos

Número de registros: 10

Respuesta | Restricciones

PRO_CODIGO	INV_CODIGO	INV DESCRIPCION	INV_ID_PAIS	MED_CODIGO	PREDIO_CODIGO	RODAL_CODIGO	PARL_CODIGO	PARL_ID_TIT
100	100	Inventario Ejemplo	175	1	100	1	1	
100	100	Inventario Ejemplo	175	1	100	1	2	
100	100	Inventario Ejemplo	175	1	100	1	3	
100	100	Inventario Ejemplo	175	1	100	1	4	
100	100	Inventario Ejemplo	175	1	100	1	5	
100	100	Inventario Ejemplo	175	1	100	1	6	
100	100	Inventario Ejemplo	175	1	100	1	7	
100	100	Inventario Ejemplo	175	1	100	1	8	
100	100	Inventario Ejemplo	175	1	100	1	9	
100	100	Inventario Ejemplo	175	1	100	1	10	

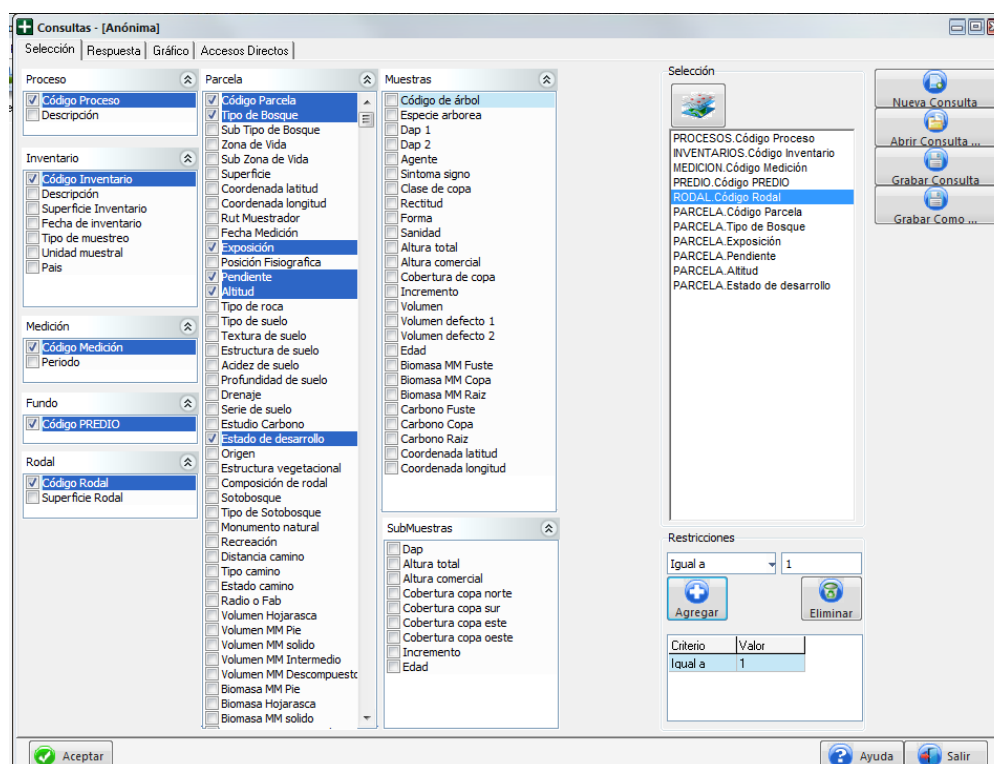
	PRO_CODIGO	INV_CODIGO	INV_ID_PAIS	MED_CODIGO	PREDIO_CODIGO	RODAL_CODIGO	PARL_CODIGO	PARL_ID_TIT
Desviación Estándar	0.00	0.00	0.00	0.00	0.00	0.00	3.03	0.00
Varianza	0.00	0.00	0.00	0.00	0.00	0.00	9.17	0.00
Media	100.00	100.00	175.00	1.00	100.00	1.00	5.50	8.00
Máximo	100.00	100.00	175.00	1.00	100.00	1.00	10.00	8.00
Mínimo	100.00	100.00	175.00	1.00	100.00	1.00	1.00	8.00

Ayuda | Salir

Results Screen for Plot Query in Direct Access on BINFO Query

9.3 Method for Creating Queries

A query is basically choosing one or more variables available in the BINFO engine. These available variables are displayed in one of the Initial Screen windows. To select them, all that is needed is to check the box on the left of each variable. Then the selected variable will be placed in a Query window in order to show the Query structure.



Using the method described, the user must select all the relevant variables, which will be collected in the bottom screen window to then become the structure of the Query. In practical terms, it is convenient for the variables to be chosen in hierarchical order so the result is presented in these terms. It is also crucial to note that the PROCESS variable always has to be included in the Query, as it is based on the Process number that the system performs the calculation of dasometric variables which will be described later.

Once the relevant variables have been selected, the system makes it possible to condition one or more of these variables according to the user's needs. Thus, when the pointer is placed in one of the selected variables it becomes possible – using the Restrictions window– to generate a condition to organize the search for the necessary information. To do this there is a box that enables the user to select one of the following operations:

- Less than

- Equal to
- Greater than
- Different from
- Divided by

Once the operation has been chosen, enter the value that is needed for the operation – in the right pane – which provides the engine with sufficient information to narrow the search to the specified requirements. The following is an example:

If we consider the Stand Code variable, it is possible to generate the following restrictions:

Variable	Operación	Valor
Stand Code	Equal to	1
Stand Code	Different from	1
Stand Code	Divided by	1 3
Stand Code	Greater than	1
Stand Code	Less than	1

For this example, in the first alternative (Equal to), the system selects the user-requested background information only for Stand 1, this way the variables associated to the Query will be entirely specific. Likewise, the rest of the operations make it possible to guide the Query so that the user can access different levels of information, without having to search through all the databases and discard all the records that are not relevant.

In the previous figure, the Query screen shows a structured Query, which can be explained as follows:

Level of information	Variable	Restricted Operation	Restriction Value
PROCESS	Process Code	Equal to	100
INVENTORY	Inventory Code	Equal to	100
MEASUREMENT	Measurement Code	Equal to	1
FIELD	Field	Equal to	100
STAND	Stand Code	Equal to	1
PLOT	Plot Code		
PLOT	Forest Type		
PLOT	Exposure		
PLOT	Slope		

PLOT Height

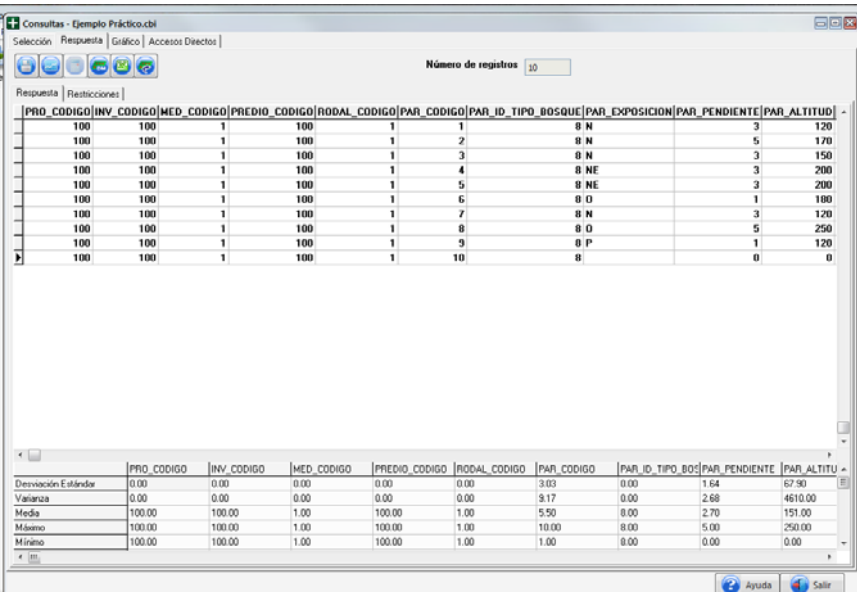
PLOT State of Development

Given that the data is in hierarchical order, the level of information becomes a fundamental component in structuring the Query. For instance, six levels of information are used to construct the Query (PROCESS, INVENTORY, MEASUREMENT, FIELD, STAND and PLOT), where the first five variables are restricted.

This way, the Query results are presented in a list of “n” records that include fields indicated by the selected variables, and that have been adjusted according to the specified restrictions. The following image presents a sample of the Results screen.

Query Response

The values associated with the variables that were incorporated to the Query are in the Response Window, ordered from left to right according to the initial structure of the Query.



The screenshot shows a software window titled "Consultas - Ejemplo Práctico.cbl" with tabs for "Selección", "Respuesta", "Gráfico", and "Accesos Directos". The "Respuesta" tab is active, displaying a table of query results. The table has 10 columns: PRO_CODIGO, INV_CODIGO, MED_CODIGO, PREDIO_CODIGO, ROTAL_CODIGO, PAR_CODIGO, PAR_ID_TIPO_BOSQUE, PAR_EXPOSICION, PAR PENDIENTE, and PAR ALTITUD. The results are ordered by these columns. A "Número de registros" field shows 10 records. At the bottom, a summary table provides statistical data for the variables.

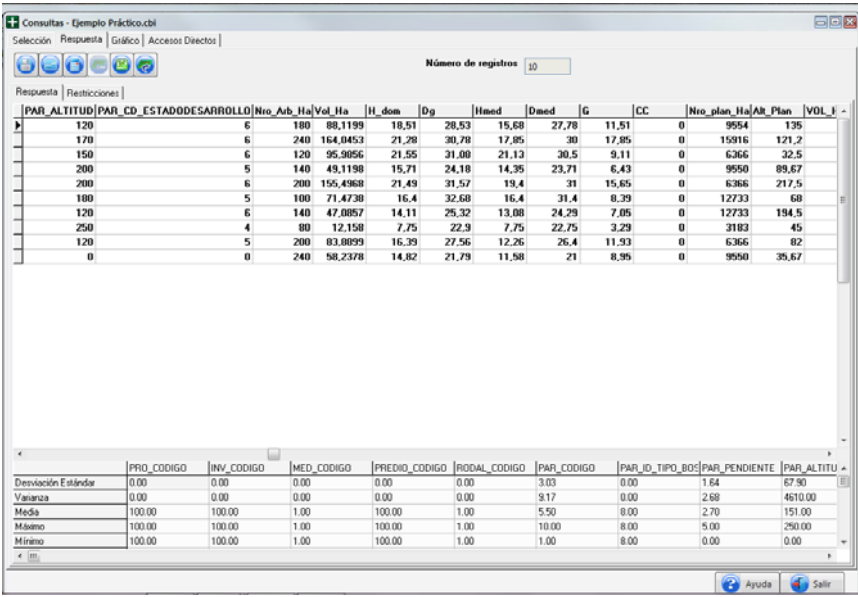
	PRO_CODIGO	INV_CODIGO	MED_CODIGO	PREDIO_CODIGO	RODAL_CODIGO	PAR_CODIGO	PAR_ID_TIPO_BOSQUE	PAR PENDIENTE	PAR ALTITUD
Desviación Estándar	0.00	0.00	0.00	0.00	0.00	3.03	0.00	1.64	67.90
Varianza	0.00	0.00	0.00	0.00	0.00	9.17	0.00	2.68	4610.00
Media	100.00	100.00	1.00	100.00	1.00	5.50	0.00	2.70	151.00
Máximo	100.00	100.00	1.00	100.00	1.00	10.00	0.00	5.00	250.00
Mínimo	100.00	100.00	1.00	100.00	1.00	1.00	0.00	0.00	0.00

BINFO Query Response Screen

Finally, there is a window in the bottom left of the screen that shows statistical background of the variables incorporated into the Query, which have been calculated with the values returned in the aforementioned Results window.

Calculating Dasometric Variables

Once the finished Query Response has been presented, it is possible to generate a series of Dasometric Variables associated to the background returned by BINFO. To achieve this, use the Dasometric Button to execute the pertinent process. A series of additional Dasometric Values are added to each record. The variables are grouped by level according to the last level in the Query, that is, if the Query reaches the level of PLOT, the dasometric values will be presented by plot. In another case, if the Query is at the level of STAND, the dasometric background information will be organized by stand, etc.



The screenshot shows a software window titled "Consultas - Ejemplo Práctico.cbi". It has tabs for "Selección", "Respuesta", "Gráfico", and "Accesos Directos". The "Respuesta" tab is active, showing a table of data. Above the table, there are icons for various functions and a "Número de registros" field set to 10. Below the table, there is a summary section with fields for "Desviación Estándar", "Varianza", "Media", "Máximo", and "Mínimo" for various codes. The table itself has columns for "PAR_ALTITUD", "PAR_CD_ESTADODESARROLLO", "Nro_Arb_Ha", "Vol_Ha", "H_dom", "Dg", "Hmed", "Dmed", "G", "CC", "Nro_plan_Ha", "Alt_Plan", and "VOL_I".

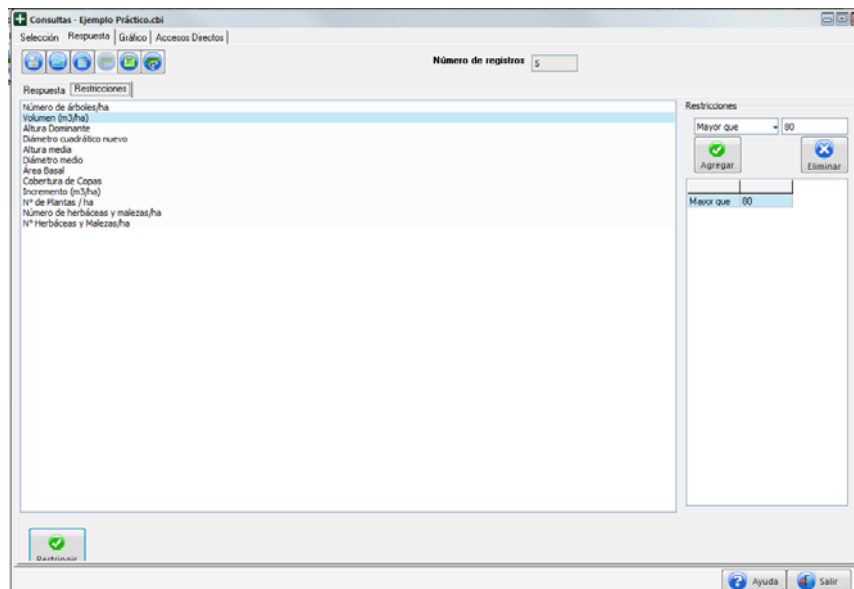
PAR_ALTITUD	PAR_CD_ESTADODESARROLLO	Nro_Arb_Ha	Vol_Ha	H_dom	Dg	Hmed	Dmed	G	CC	Nro_plan_Ha	Alt_Plan	VOL_I
120	6	180	88,1199	18,51	28,53	15,68	27,78	11,51	0	9954	135	
170	6	240	164,9453	21,28	30,78	17,95	30	17,95	0	18916	121,2	
150	6	120	95,9056	21,55	31,08	21,13	30,5	9,11	0	6366	32,5	
200	5	140	48,1198	15,71	24,18	14,35	23,71	6,43	0	9950	89,67	
200	6	200	155,4968	21,49	31,57	19,4	31	15,65	0	6366	217,5	
180	5	100	71,4738	16,4	32,68	16,4	31,4	8,39	0	12733	68	
120	6	140	47,8857	14,11	25,32	13,08	24,29	7,05	0	12733	194,5	
250	4	80	12,158	7,75	22,9	7,75	22,75	3,29	0	3183	45	
120	5	200	83,8899	16,39	27,56	12,26	26,4	11,93	0	6366	82	
0	0	240	58,2378	14,82	21,79	11,58	21	8,95	0	9950	35,67	

	PRIO_CODIGO	INV_CODIGO	MED_CODIGO	PREDIO_CODIGO	RODAL_CODIGO	PAR_CODIGO	PAR_ID_TIPO_BOS	PAR_PENDIENTE	PAR_ALTITU
Desviación Estándar	0.00	0.00	0.00	0.00	0.00	3.03	0.00	1.64	67.90
Varianza	0.00	0.00	0.00	0.00	0.00	9.17	0.00	2.68	4610.00
Media	100.00	100.00	1.00	100.00	1.00	5.50	8.00	2.70	151.00
Máximo	100.00	100.00	1.00	100.00	1.00	10.00	8.00	5.00	250.00
Mínimo	100.00	100.00	1.00	100.00	1.00	1.00	8.00	0.00	0.00

It is important to keep in mind that when the Level of the query reaches that of SAMPLE, that is, the background are requested by "tree," calculating the dasometric variables is done taking into account the number of trees per hectare that each tree in the plot represents, which is equivalent to the Plot Expansion Factor to be taken to the level of hectare. This way, the variables associated to Surface Units are calculated based on the values per individual tree (base area, volume, growth, etc.) taken to hectare by multiplying them by the number of trees per hectare that each individual tree represents.

Restrictions on Dasometric Variables

In order to condition responses related to dasometric variables, the system has a Restrictions palette that makes it possible to limit the data the response presents according to user settings. Therefore, in order to use this function, enter the Restrictions palette, which basically presents two windows. The first contains a list of the calculated dasometric variables, while the second (Restrictions window) makes it possible to condition one or more dasometric variables according to the analyst's needs, using the same method described in the section on creating Queries.








Screen for Dasometric Variable Restrictions

In order to execute the operation that has been defined it is necessary to press the Restrict button that is displayed in the active window, after the restrictions have been made.

This is the way the system adjusts the Query and presents records that comply with all the prerequisites the analyst has defined, as can be seen in the following figure.

Consultas - Ejemplo Práctico.cbi

Selección | Respuesta | Gráfico | Accesos Directos



Número de registros 5

Respuesta | Restricciones

PAR_ALTITUD	PAR_CD_ESTADO	DESARROLLO	Nro_Arb_Ha	Vol_Ha	H_dom	Dg	Hmed	Dmed	G	CC	Nro_plan_Ha	Alt_Plan	VOL_F
120	6	180	88.1199	18.51	28.53	15.68	27.78	11.51	0	9554	135		
170	6	240	164.0453	21.28	30.78	17.85	30	17.85	0	15916	121.2		
150	6	120	95.9856	21.55	31.08	21.13	30.5	9.11	0	6366	32.5		
200	6	200	155.4968	21.49	31.57	19.4	31	15.65	0	6366	217.5		
120	5	200	83.8899	16.39	27.96	12.26	26.4	11.93	0	6366	82		

	PRO_CODIGO	INV_CODIGO	MED_CODIGO	PREDIO_CODIGO	MODAL_CODIGO	PARL_CODIGO	PAR_ID_TIPO_BOS	PAR_PENDIENTE	PAR_ALTITU
Desviación Estándar	0.00	0.00	0.00	0.00	0.00	3.03	0.00	1.64	67.90
Varianza	0.00	0.00	0.00	0.00	0.00	9.17	0.00	2.68	4610.00
Media	100.00	100.00	1.00	100.00	1.00	5.50	6.00	2.70	151.00
Máximo	100.00	100.00	1.00	100.00	1.00	10.00	8.00	5.00	250.00
Mínimo	100.00	100.00	1.00	100.00	1.00	1.00	6.00	0.00	0.00

Ayuda

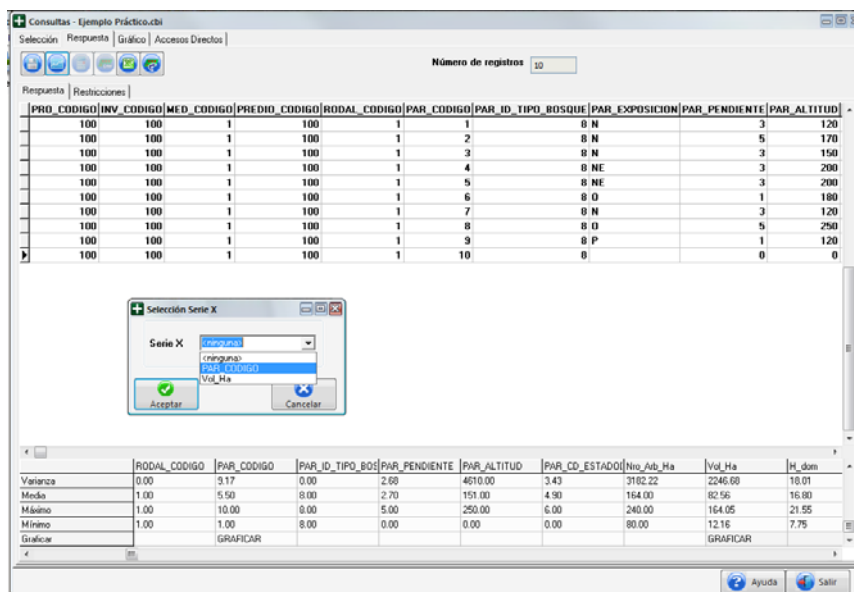
Salir

Restricted Dasometric Variable Response Screen

Obviously, once the new response has been generated, the system again calculates the statistical indicators in the bottom window, using only the chosen records.

Charting Results

The system enables the user to generate charts with any of the variables present in Query Response. To do so it is necessary in the first place to select the relevant variables. This is done in the final row (Chart) of the Statistics window, using the mouse to click the bottom cell of the column that has the variable to be used. When the variable has been selected, in the blank cell the word “Chart” will appear, and the user will know which variable(s) are arranged to be included in the chart. To uncheck any variable, use the same mechanism.



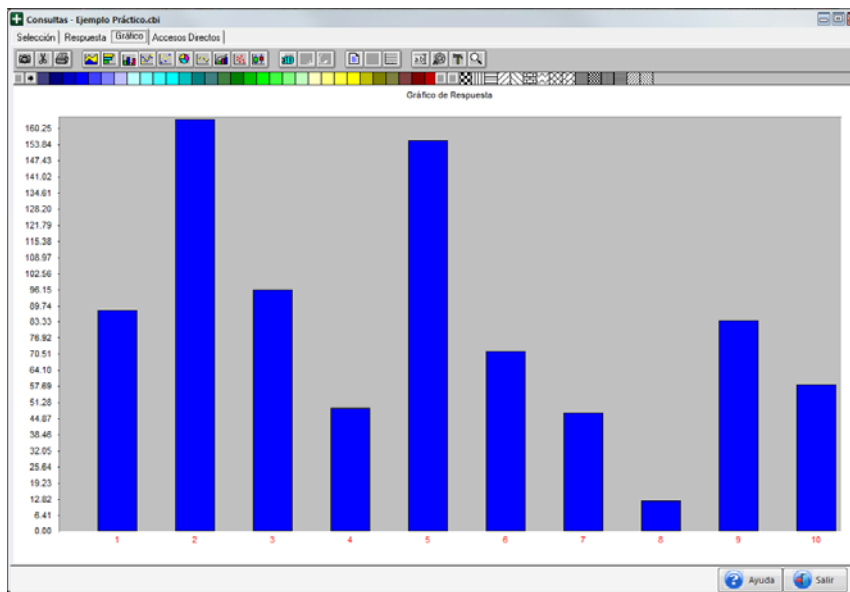
Sample Screen to create a chart

Once the values to chart have been selected, it is necessary to press the Chart Button displayed in the top left of the window. Pressing this Button calls up a box over the window (Select Variable X) which presents the list of selected variables and provides the option to select any of them to be located as the X axis of the graph that is being constructed.

If you do not wish to configure the X-axis with any variable, it only requires pressing the Accept button in the box for the chart to be generated. In this case, the X-axis on the resulting chart will be the record number that the selected variables' values are, and they will be charted in the Y-axis of these variables.

In these cases, it is necessary to verify the units that the variables are in, given that there is only one scale for all of the charted variables.

On the contrary, if one of the available variables is selected in the Select Variable X box, an XY graph will be produced with the defined X axis and the Y axis according to the other selected variable(s), as shown in the next figure, where - using the same background as in the previous graph, the Plot Code variable was chosen for the Y axis. The variable charted in the Y axis will be the Volume.

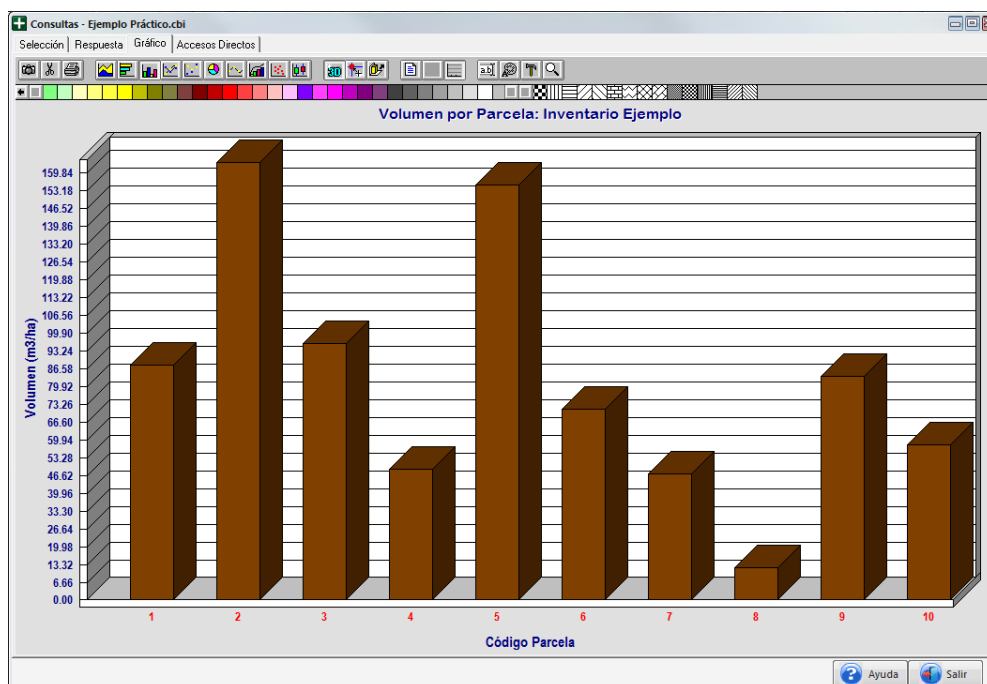


View of a chart generated with BINFO

In the previous figures, it can be seen that the first chart presented is very basic. However, the software has a series of tools to improve the chart's appearance, and then incorporate basic information that it should include.

These tools are located in the icons along the top of the window. They make it possible to add the name of the chart to the chart, and its axes, as well as the units the variables have been expressed in, personalize the colors of the different areas of the chart, add labels to the data, configure the scale settings for the axes, etc. Likewise, it is possible to change the Type of Chart according to the effect the analyst is looking for in presenting the background data.

Accordingly, the following is another version of the same chart from the previous figure, after having improved the "Presentation" using the tools described.



View of a chart that has been improved with BINFO tools

Saving Results in Files

BINFO also has a tool that makes it possible to save the results of a query in Excel format files.

This makes it possible to obtain basic information from the Analyzer, then generate files with a .CVS extension that can be used with practically any Geographic Information System. The only condition is that the query coordinates of the Sample Units (plots) and/or trees have to be selected, which are generated with the information on azimuth and distance with regard to the center point of the Plot.

Additionally, the Excel format information can be organized, reprocessed or presented in the manner the user would like.

Microsoft Excel window titled "Ejemplo Práctico [Modo de compatibilidad] - Microsoft Excel". The ribbon shows "Inicio" with options for "Calibri", "11", "General", "Pegar", "Fuente", "Alineación", "Número", "Estilos", "Insertar", "Eliminar", "Formato", "Celdas", "Ordenar y filtrar", "Buscar y seleccionar", and "Modificar". The active cell is J1, containing the text "PAR_ALTITUD".

	J	K	L	M	N	O	P	Q	R
1	PAR_ALTITUD	PAR_CD_EST	Nro_Arb_Ha	Vol_Ha	H_dom	Dg	Hmed	Dmed	G
2	120	6	180	88.1199	18.51	28.53	15.68	27.78	11.51
3	170	6	240	164.0453	21.28	30.78	17.85	30	17.85
4	150	6	120	95.9856	21.55	31.08	21.13	30.5	9.11
5	200	5	140	49.1198	15.71	24.18	14.35	23.71	6.43
6	200	6	200	155.4968	21.49	31.57	19.4	31	15.65
7	180	5	100	71.4738	16.4	32.68	16.4	31.4	8.39
8	120	6	140	47.0857	14.11	25.32	13.08	24.29	7.05
9	250	4	80	12.158	7.75	22.9	7.75	22.75	3.29
10	120	5	200	83.8899	16.39	27.56	12.26	26.4	11.93
11	0	0	240	58.2378	14.82	21.79	11.58	21	8.95
12									
13									
14									
15									

Microsoft Excel Screen with BINFO data

10. SEQUENCE EXAMPLES

Finally, and as an example, the following are processing sequences of the three cases of information queries. This way, the user has an overview of the basic processing aspects, and some specifics, particularly regarding the information required in each situation.

Summary of basic processing sequences for +BOSQUE – Example 1			
Example 1... "THE SIMPLEST...": Data Processing Sequence Plantation to Estimate Volume			
There are inventory data in a plantation including DBH, some Total Height, and a specific Volume Function			
Sequence	Location	What to do?	What information?
Step 1	DB Management – Tree Species	Verify existence of the species when processing in the System Tree Species Table and enter the Code to complete the data on the Excel Data Entry Template.	Species Code, Scientific Name, Common Name, Country
Step 2	Excel External Data Entry Template	(a) Enter information on Inventory, Field, and Stand to incorporate to the system. (b) Enter general information that is common for the entire Sample Unit. (c) Incorporate Dendrometric Information on Sample Trees included in the Principal Sample Unit (PSU). (d) Incorporate detailed information on subsample trees to adjust the regression.	Inventory Data, Field and Stand(s); Plot Data; Sample Tree Data, on Data of Subsample Trees
Step 3	DB Management – External Data Entry	Import Data from Excel Template to the Land Analysis System for Forest Resources	Excel File containing all Inventory Data
Step 4	Data Entry – Processes	Define the Process and select Inventory information from the data base	Process Code and description. Select Inventory; Measurement; Field; Stand(s); Plot
Step 5	Data Processing - Generic Species Definition	Define Generic Species for Tree Species and the Total Height variable	Process Code - Select Variable – Select Tree Species
Step 6	Data Processing – Adjust Function settings: f(DBH) Variables	Find Total Height Function Adjustment and select the most appropriate (system default defines the best)	Process Code – Generic Species selection and Total Height Variable
Step 7	Data Processing – Estimating Variables f(DBH)	Define Height Function to be used and calculate Total Height for all the trees in the sample	Process Code – Modify system defined Functions
Step 8	Data Processing – Calculate Tree Volume	Define Volume Function to be used for Tree Species in the analysis, and calculate volume per tree.	Process Code – Assign Volume Functions to each Tree Species
Step 9	Reports – Results Reports – Stand and Inventory Table	Displays the Stand and Inventory Table that is the result of processing the information defined in the selected parameters.	Process Code – Inventory – Measurement – Field – Stand – Plot – Tree Species – Width (mm)

Summary of basic processing sequences for +BOSQUE – Example 2			
Example 2... “SEARCHING FOR AN OBJECTIVE ...”: Data Processing Sequence Natural Forest to Estimate carbon			
There are inventory data in natural forests, including: Tree Measurement, Dead Wood Measurement, Litter Measurement			
Sequence	Location	What to do?	What information?
Step 1	DB Management – Tree Species	Verify existence of the species when processing in the System Tree Species Table and complete - where necessary – the FEB, Density, Carbon Fractions and specific Volume Functions. Register Codes	Species Code, Scientific Name, Common Name, Country, FEB, Density, Carbon Fractions, Volume Functions
Step 2	Excel External Data Entry Template	(a) Enter information on Inventory, Field, and Stand to incorporate to the system. (b) Enter general information that is common for the entire Sample Unit. (c) Incorporate Dendrometric Information on Sample Trees included in the Principal Sample Unit (PSU). (d) Incorporate detailed information on subsample trees to adjust the regression. (e) Add information on Lines Transect (LT) destined to describing and quantifying the presence of dead wood in the inventory area. (f) Incorporate litter depth measurements to quantify information about the existing level of litter in the sample area.	Inventory Data, Field and Stand(s); Plot Data; Sample Tree Data, on Data of Subsample Trees; Line Transect Data for Dead Wood; Litter Depth Data
Step 3	DB Management – External Data Entry	Import Data from Excel Template to the Land Analysis System for Forest Resources	Excel File containing all Inventory Data
Step 4	Data Entry – Processes	Define the Process and select Inventory information from the data base	Process Code and description. Select Inventory; Measurement; Field; Stand(s); Plot
Step 5	Data Processing – Generic Species Definition	Define one or more Generic Species for Tree Species subgroups, and the Total Height variable	Process Code - Select Variable – Select Tree Species
Step 6	Data Processing – Adjust Function settings: f(DBH) Variables	Find Total Height Function Adjustment and select the most appropriate (system default defines the best)	Process Code – Generic Species selection and Total Height Variable
Step 7	Data Processing – Estimating Variables f(DBH)	Define Height Function to be used and calculate Total Height for all the trees in the sample	Process Code – Modify system defined Functions
Step 8	Data Processing – Calculate Tree Volume	Define Volume Function to be used for Tree Species in the analysis, and calculate volume per tree.	Process Code – Assign Volume Functions to each Tree Species
Step 9	Reports – Results Reports – Stand and Inventory Table	Displays a summary of volumes, biomass and existence of carbon for different components present in the forest by selected sample units	Process Code – Inventory – Measurement – Field – Stand – Plot

Summary of basic processing sequences for +BOSQUE – Example 3			
Example 3... “ADDED VALUE ...”: Data Processing Sequence Natural Forest Data to Estimate carbon and Biodiversity and Degradation Indicators			
There are inventory data in natural forests, including: Tree Measurement, Dead Wood Measurement, Litter Measurement, Regeneration Measurement, Herbaceous plant species Measurement			
Sequence	Location	What to do?	What information?
Step 1	DB Management – Tree Species	Verify existence of the species when processing in the System Tree Species Table and complete - where necessary – the FEB, Density, Carbon Fractions and specific Volume Functions. Register Tree Species Codes to complete data on Excel Data Entry Template	Species Code, Scientific Name, Common Name, Country, FEB, Density, Carbon Fractions, Volume Functions
Step 2	Excel External Data Entry Template	(a) Enter information on Inventory, Field, and Stand to incorporate to the system. (b) Enter general information that is common to the entire Sample Unit. (c) Incorporate Dendrometric Information on Sample Trees included in the Principal Sample Unit (PSU). (d) Incorporate detailed information on subsample trees to adjust the regression. (e) Add background information for Secondary Sample Units (SSU) to describe and quantify the information on actual regeneration in the area of the measurement. (f) Enter background info on Tertiary Sample Units (TSU) to describe presence of actual herbaceous species in the inventory area. (g) Add information on Line Transect (LT) to describe and quantify the presence of dead wood in the inventory area. (h) Incorporate litter depth measurements to quantify information on actual litter volume in the sample area.	Inventory Data, Field and Stand(s); Plot Data; Sample Tree Data; Subsample Tree Data; Regeneration Data; Herbaceous Plant Species Data; Line Transect Data for Dead Wood; Litter Depth Data
Step 3	DB Management – External Data Entry	Import Data from Excel Template to the Land Analysis System for Forest Resources	Excel File containing all Inventory Data
Step 4	Data Entry – Processes	Define the Process and select Inventory information from the data base	Process Code and description. Select Inventory; Measurement; Field; Stand(s); Plot
Step 5	Data Processing - Generic Species Definition	Define one or more Generic Species for Tree Species subgroups, and the Total Height variable	Process Code - Select Variable – Select Tree Species
Step 6	Data Processing – Adjust Function settings: f(DBH) Variables	Find Total Height Function Adjustment and select the most appropriate (system default defines the best)	Process Code – Generic Species selection and Total Height Variable
Step 7	Data Processing – Estimating Variables f(DBH)	Define Height Function to be used and calculate Total Height for all the trees in the sample	Process Code – Modify system defined Functions
Step 8	Data Processing – Calculate Tree Volume	Define Volume Function to be used for Tree Species in the analysis, and calculate volume per tree.	Process Code – Assign Volume Functions to each Tree Species
Step 9	Reports – Results Reports – Carbon per Component	Displays a summary of volumes, biomass and existence of carbon for different components present in the forest according to selection of user defined parameters for sample units	Process Code – Inventory – Measurement – Field – Stand – Plot
Step 10	Reports – Specific Results – Biodiversity Indicators	Displays a series of Plant Biodiversity Indicators based on information from the inventory. The level of aggregation depends on the user defined parameters set when the report was created	Process Code – Inventory – Measurement – Field – Stand – Plot
Step 11	Reports – Specific Results – Degradation Indicators	Displays a series of Indicators for Forest Degradation based on information from the inventory. The level of aggregation depends on the user defined parameters	Process Code – Inventory – Measurement – Field – Stand – Plot

set when the report was created